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Message From  
YAB Datuk Patinggi (Dr) Abang Haji Abdul Rahman Zohari Bin Tun Datuk Abang Haji Openg  
Chief Minister of Sarawak.

Assalamualaikum wr. Wb

On behalf of the people of Kuching and the organising committee, it is my privilege and honour to welcome you to Sarawak, Land of the Hornbills for the 5th International Seminar on Sports and Exercise Psychology 2018.

The ISSEP is not only created to promote sports and exercise psychology in Asia, demonstrating that sports is related to competition, but also to encourage research in sport education, sharing of findings and participation of all interested parties. It seeks to foster the exchange of ideas and dissemination of scientific research findings related to the main theme Enhancing Sports and Exercise Psychology in Sports, Physical Education, Physical Activities and Health. This will ensure that sports and physical activities are given an appropriate place in the development of potential world class athletes. I am confident that all of us in this seminar would look forward to building collaborations and expanding international relationships among sport entities of different disciplines.

I would like to extend my sincere appreciation to the Ministry of Tourism, Arts, Culture Youth and Sports Sarawak Sports Corporation, Institute of Teacher Education Tun Abdul Razak Campus and UiTM Sarawak who have organised this auspicious event. This is an excellent example of institutions taking a lead in promoting transformation and excellence in sports and exercise psychology.

Thank you.

YAB Datuk Patinggi (Dr) Abang Haji Abdul Rahman Zohari Bin Tun Datuk Abang Haji Openg  
Chief Minister of Sarawak.
Assalamualaikum wr. Wb

Firstly, I would like to welcome you to the 5th International Seminar on Sports and Exercise Psychology 2018. I am very happy to be the patron of this unique programme.

With the collaboration among the Ministry of Tourism, Arts, Culture, Youth and Sports Sarawak, the Sarawak Sports Corporation (SSC), Institute of Teacher Education Tun Abdul Razak Campus, Kota Samarahan and UiTM Sarawak, we have succeeded in organising this memorable event to provide a venue for discussion and exchange of ideas in the field of coaching, sports and exercise psychology.

With the participation of all stakeholders in sports such as coaches, administrators, sports practitioners and academicians from both local and overseas, this seminar will not only provide opportunities for forming mutual partnerships, but also stimulate the development of various sports-related competencies, especially towards realizing the Key Result Area (KRA) 6 and the vision to make Sarawak as a sport power house and will be integrated into the overall tasks and duties of our responsibilities, particularly in the field of sports.

I would like to thank all those who have made the program a reality for their dedication and hard work. Finally, I sincerely wish you all have very informative and inspiring days of talks and workshops.

Thank you.

YB Datuk Haji Abdul Karim Rahman Hamzah
Minister of Tourism, Arts, Culture, Youth and Sports
Greetings and Salam 1Malaysia.

I am very pleased to welcome you to the 5th International Seminar on Sports and Exercise Psychology 2018, a very special program where the knowledge and expertise of leading experts can hopefully be shared with all the participants.

The organizing of this seminar is aimed at giving the opportunity to enhance sports advancement, improve sports management systems, and develop sports and exercise psychology competencies so that an athlete’s potential can be optimally developed to meet the country’s sporting aspirations in the future.

With the theme “Enhancing Sports and Exercise Psychology in Sports, Physical Education, Physical Activities and Health”, sports organizations, coaches, and institutions of higher learning will have the opportunity to work together with coaches, sports administrators and associations to become strategic partners in networks that share new initiatives in the practice and innovation of sports and exercise psychology.

I expect these two days to result in important exchanges in the field of sports psychology research, as a driving force for sports development in Sarawak. Hopefully, this program will be another avenue for the latest development in the many disciplines of sports science to be disseminated to coaches of all levels.

I, therefore, sincerely wish you all will gain more learning and new insights over the next two days.

Thank you.

YB Datuk Snowdan Lawan
On behalf of the ISSEP2018 organising committee, I am honoured and pleased to welcome you to the 5th International Seminar on Sports and Exercise Psychology (ISSEP) 2018 in Kuching, Malaysia. With a record number of 60 speakers and presenters from Taiwan, Korea, Thailand, Japan, Hong Kong and Malaysia, we are delighted to see that this seminar are becoming larger and more substantial every year. This richness of ideas and resources bodes well for the future of the field.

The theme of this year’s seminar, Enhancing Sports and Exercise Psychology in Sports, Physical Education, Physical Activities and Health is well-suited as we need to address the psychology and mental health issues among athletes and non-athletes in sports and physical education.

Over the past 4 years, the ISSEP has grown to be a major international seminar in sports and exercise psychology within the Asia-Pacific Region. Through this seminar, it is envisaged to share and disseminate information relevant to research and practical experiences within these disciplines.

I hope that you will find the seminar both enjoyable and valuable.

Mr. Hii Chang Kee
Permanent Secretary
Ministry of Tourism, Arts, Culture, Youth and Sports
Welcome Address From
Dr Ong Kong Swee
Chief Executive Officer
Sarawak Sports Corporation

It is our great pleasure to host this 5th International Seminar on Sports and Exercise Psychology 2018 in Kuching, Malaysia. This seminar aims to share current research findings, good practices and provide opportunities for collaboration and networking with colleagues, fellow counterparts and students within the Asia-Pacific regions. It is also necessary to amplify our expected role in meeting the psychological and mental health needs of athletes and non-athletes in our society.

In addition to this, this seminar hopes to provide a platform for concerned parties to discuss future directions in sport science education, which has attracted speakers, presenters and participants from Taiwan, Korea, Thailand, Japan, Hong Kong and Malaysia. Furthermore, it features keynote addresses by prominent leaders from the International Society of Sport Psychology (ISSP), Asian-South Pacific Association of Sport Psychology (ASPASP) and the Federation Internationale D’Education Physique (FIEP) - Asia. The seminar also showcases workshops in related areas to provide opportunities for continuous professional development (CPD) for sport science practitioners. The seminar also supports the Sarawak Sports Corporation’s efforts to play an active role in the social development of the state - towards building a healthy and disciplined society through sports.

Finally, I sincerely hope that you will have an enjoyable and fruitful stay in Kuching.

Dr Ong Kong Swee
Chief Executive Officer
Sarawak Sports Corporation
Assalamualaikum wr. wb.

We are very grateful today because, by the grace of Allah SWT, we can once again gather for the 5th International Seminar on Sports and Exercise Psychology 2018. This is an excellent opportunity for concerned practitioners to network with experts in sports science and coaching, especially in Sarawak.

I am very pleased to see the close cooperation between various organizing agencies, working together for the betterment of coaches and sports associations. By organizing such seminar, sports bodies like Institut Sukan Negara (ISN), Majlis Sukan Negeri Sarawak (MSNS), other institutions of higher learning and sports associations can fulfill their role to propel coaching competencies through deeper understanding and sharing of current sports science practices.

This is important not only in promoting the application of sports science in coaching but also applying it through all levels of competition, right down to the grassroots level. In turn, this will ensure our young athletes will be competitive internationally and not just locally or nationally, as evidenced most recently in the 29th SEA Games in Kuala Lumpur.

The knowledge gained through this seminar can be disseminated to other coaches, administrators and athletes so that they too will have the tools to guide and groom future successful athletes.

With this in mind, I wish all participants to have an interesting event with plenty of new insights and ideas. May the knowledge gained in this gathering be useful to all parties concerned, and may it be an enlightening experience for all.

Thank you.

Mdm Hamsiah Binti Abdullah Masni
Director
Institute of Teacher Education Tun Abdul Razak Campus.
Editorial Board

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Burapha University, Thailand

Frank Lu Jing-Horng  
Chinese Culture University Taiwan

Lim Boon Hooi  
University of Malaya, Malaysia

Wee Eng Hoe  
Tunku Abdul Rahman University College, Malaysia
## Section 1

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Keynote Address 1

Understanding of Physical Activity Correlates in the Theory-Based Holistic Viewpoints
YoungHo Kim
Department of Sport Science, Seoul National University of Science and Technology, Korea

Abstract

It is well documented that active lifestyles including regular physical activity are an important contributor to the reduction of various negative symptoms and the prevention of many chronic diseases. Nevertheless, many people around the world have failed to engage in physical activity on a regular basis. Physical activity and its related factors are very complex. It means that physical activity is difficult to change without clear understanding of relationships between them. In this regard, research suggests that psychological, social, and physical environment variables impact on the ability or likelihood of individuals participating in physical activity. Recently, in exercise psychology concerted efforts have been directed towards not only psychosocial factors, but environmental factors that might be useful for encouraging and supporting physical activity initiation and/or maintenance among people. In addition to this approach, there has been a shift towards theoretically based studies that concentrate on physical activity adherence focusing on the broad range of interactions among those variables. The current presentation, in the first part, introduce physical activity correlates on a broad range of antecedents of physical activity based on the transtheoretical model. In the last part of the presentation, I will introduce the prospective viewpoint of social ecological model which is taking into consideration the multiple levels of influence on physical activity participation.

Keywords: Physical activity, Exercise psychology, Transtheoretical model, Social ecological model
Keynote Address 2

Investigating Athletic Mental Energy: What it is? And How it measured
Frank Lu Jing-Horng
Chinese Culture University, Taiwan

Abstract

Mental energy is defined as “...maintaining long hours of working with high attention on a given task (Cook & Davis, 2006).” However, the idea of athletic mental energy (AME) has never been conceptualized and studied. The purpose of this workshop was to conceptualize athletic mental energy and develop an initial measuring tool. We use both quantitative and qualitative methods to conceptualize the concept of “athletic mental energy (AME). Results showed AME is defined as “an athlete’s perception on existing state of energy which is characterized by having high motivation, high sport spirit, high confidence, high concentration, high vigor but low anxiety. By using item analysis, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), a 6-factor, 34-item athletic mental energy scale (AMES) has been developed with adequate content validity, factorial validity, and internal consistency. Future research directions are suggested. Also, possible applications are provided.

Keywords: elite athlete, psychology of sports excellence, concentration, optimal state of mind, sport confidence
Keynote Address 3

Examining Relationship between Exercise Self-Efficacy and Social Support in Physical Activity Participation among College Students

Wee Eng Hoe
Department of Sport Science, Faculty of Applied Sciences, Tunku Abdul Rahman University College, Malaysia

Abstract

The paper investigated the relationship between exercise self-efficacy and social support in physical activity participation among college students. A total of 380 students (19.66±1.323) from a private university college in Kuala Lumpur were conveniently surveyed. The questionnaires used for the research were Self-efficacy and Exercise Habits Survey (α = 0.930) (Sallis et al., 1988) and Social Support for Physical Activity Scale (α = 0.902) (Sallis et al., 1987). In terms of living arrangement, 43% of the participants lived with family, 22% lived in university hostel and 27% shared rooms with others. As for the mode of transport, the three most popular modes were walking (33.4%), bus (24.7%) and driving car alone (21.1%). Most popular physical activities of the participants were exercise activities, individual sport and team sport. Eighty-eight per cent of the participants exercised with friends, 30% with family members and 29% exercised alone. Analysis of self-efficacy showed significant results according to age groups (t=1.588, p=0.020) with the 22-23 age group differed significantly from the other two groups (20-21, 18-19) but no significant differences were found according to gender (t=1.684, p=0.093), living arrangement (t=1.138, p=0.276) and mode of transport (t=0.760, p=0.841). Analysis of social support revealed that there were no significant differences according to gender, age groups, living arrangement and mode of transport. However, there was a significant difference in ‘friend support’ according to gender (t=1.977, p=0.049) with male needed friend support more than female participants. In terms of relationship, results showed significant relationships between self-efficacy and social support (r=.299, p<0.05). In addition, there was also a significant relationship between the ‘sticking to it’ and ‘making time for exercise’ (r=.637, p<0.05); ‘sticking to it’ and social support (r=.292, p<0.05); ‘making time for exercise’ and social support (r=.241, p<0.05); ‘family support’ and self-efficacy (r=.099, p<0.05); ‘friend support’ and self-efficacy (r=.372, p<0.05). In conclusion, self-efficacy was significantly correlated to social support and male participants scored higher in self-efficacy and social support compared to female participants.

Keywords: Self-efficacy, social support, college students
Invited Speaker 1

The Mediating of the Motivational Climate in Relationship between Sport Failure Tolerance and Effort in High School Athletes
KooIn Jung
Department of Physical Education, Korea National University of Education, Korea

Abstract

The purpose of this study was to examine the mediating role of the motivational climate in relationships between sport failure tolerance and effort in high school athletes. Participants (N=321, male=207(64.5%) and female=114(35.5%)) completed the questionnaires of the failure tolerance, perceived motivational climate, and effort. SPSS 22.0 was used to calculate the descriptive statistics, correlations, and AMOS 22.0 were used for confirmatory factor analysis, and structural equation modeling with bootstrapping using of the data in this study. Competitive climate positively predicted the task difficulty, whereas after the failure of emotion and behavior did not. The mastery climate positively predicted all three dimensions of failure tolerance. After the failure of behavior and task difficulty positively predicted the effort. Finally, the relationships between perceived mastery climate and effort were partial mediated by the three dimensions of failure tolerance. Overall, this study will provide effective information for exploring variables related to performance of athletes in sport situations. We also, it is expected that it will help to find a support program and guidance plan reflecting the psychological characteristics of athletes.

Keywords: Motivational, Climate in Relationships, Sport Failure Tolerance, High School Athletes
Invited Speaker 2

The Relationship between Determinants of Athletes’ Identity and Performance: The Self-Determination Theory Perspectives

JungGil Park
Mirae Changjo Research Institute, Seowon University, Korea

Abstract

Self-determination theory (SDT; Deci & Ryan, 1985, 200) is a motivational theory that is useful for understanding individuals’ motivation, its causes, and its consequences. Grounded in this framework, numerous studies over 30 years have shown that coaches’ behaviors are significant predictors of athletes’ motivation, and that motivation is significantly related to emotions, performance, and engagement in sports. In the sport context, several authors also consider that coaches’ autonomy-supportive and controlled behaviors are relevant determinants of athletes’ identity. Few studies in this domain have examined the links between motivational variables, athletic identity, and performance. Erikson (1968) asserted that identity construction is a central task during adolescence. He proposed that identity is expressed in the activities that individuals select in pursuit of their personal goals. Athletic identity reflects the importance and exclusivity of the athlete role within individual constellation of other identities. However, little research on athletic identity has been conducted with Korean adolescent athletes despite the central importance of identity construction during this age period. Therefore, the present investigation explored the relationships between coaching behavior, motivation, athletic identity, and sport engagement among Korean adolescent athletes. A total of 598 secondary school and college athletes (422 males, 176 females) completed questionnaire assessing the key variables of interest. Results from structural equation modeling analyses provided support for the hypothesized model.

Keywords: Coaching behavior, Motivation, Athletic Identity, Self-determination theory, Satisfaction
Invited Speaker 3

A Cross-Cultural In-Depth Interview on Sports Happiness of Elite Swimming Athletes between Korea and China

Jin Hwang
Department of Physical Education, College of Education, Chonbuk National University, Korea

Abstract

While previous research highlights the important value that sports happiness can have for athletes’ quality of life, limited research has examined the sports happiness of elite athletes. The purpose of this study was to examine the difference between Korean and Chinese Elite Swimming athletes’ sports happiness and, if there was any, how the result was similar and different cross-culturally/nationally. Semi-structured interviews were conducted with total 12 elite swimming athletes. Participants were both males (n = 6) and females (n = 6), who were between 19-23 years old with average 13.9 years of swimming experience. Interviews were transcribed verbatim and were analyzed with a content analysis procedure in which raw meaning units were grouped into salient themes. Athletes’ responses regarding happiness derived from this in-depth interview revealed five categories: 1) athletes’ perception of happiness. 2) happiness in everyday life 3) happiness in practice and competition situations 4) coach-athlete relationship 5) material happiness. Social and cultural processes making these different outcomes are discussed.

Keywords: Cross-culture, Korea, China, Elite swimming athletes, sports happiness
Invited Speaker 4

Experiences as a Female Performance Psychology Consultant
Kaori Araki
Department of Human Science, Sonoda Women’s University, Japan

Abstract
As a sport psychology professional, it is crucial to fulfill the three roles which are education, research, and consultation (Weinberg & Gould, 2014). I have been teaching sport psychology at the university for ten years and conducting research since I was a graduate student. In terms of consultation, I was trained under Dr. Diane Gill and Dr. Dan Gould at the University of North Carolina at Greensboro for three years which include all the important components about bridging the gap between research and practice, even about how to develop a private practice. After I return home, Japan, my consultation career started in 2004. During the 14 years, I have been consulting with professional teams, collegiate teams, and individuals in Japan and Singapore. I also consult with cooperates persons, singers, and artists in Japan. Major contribution includes Singapore National Sailing team qualified for the Beijing Olympics and Japan National Men’s Rugby team winning three matches at the Rugby World Cup in England 2015. I also found a private practice in 2016. I will share my experiences as a female consultant.

Keywords: Female, performance, consultant
Workshop 1

The Joys and Pitfalls of being a private Consultant: What's it like to build your own practice?
Lo Cheuk Hang Karen
Inner Edge Ltd.
Hong Kong

Abstract

As a past National swimmer and a current private practitioner, I see a huge demand in frontline opportunities. I will share experiences from working with athletes, teams, parents, performers and corporate leaders in my 3 years of applied work. The workshop outlines what it takes to build your own practice, and highlights a few considerations you may need to take into account before you start building your own.
Keywords: Joys, Pitfalls, Private consultation, Practitioner.
Acute Exercise and Cognitive Function: An Update
Yu-Kai Chang
Graduate Institute of Athletics and Coaching Science, National Taiwan Sport University, Taiwan

Abstract

Acute exercise, a single bout of exercise, has been demonstrated to positively affect cognitive function (Chang, Labban, Gapi, & Etnier, 2012; Lambourne & Tomporowski, 2010) and the issue has been recognized as one of important research trends in exercise psychology. The purpose of this presentation is to report on the current developments and to provide three updated studies from our laboratory, Physical Activity Psychology and Cognitive Neuroscience Laboratory, National Taiwan Sport University. These studies emphasized: a) dose-response relationship between acute exercise duration and cognitive function (Chang et al., 2015); b) role of moderators between acute exercise and cognitive function (Chang, Chu, Wang, Song, & Wei, 2015); as well as c) potential mechanism of how acute exercise affects cognitive function from a neuroelectric perspective (Chang, Pesce, Chiang, Kuo, & Fong, 2015). The possible and recommended directions for further examination will be also discussed.

Keywords: acute exercise, event-related potential, exercise psychology, executive function, physical activity
Invited Speaker 6

Implication on Smart Wearable Devices on Monitoring of Athletes’ Training and Sleep Quality
Chi-Min Wu
Department of Leisure and Sports Management, Faculty of Sports Science
Cheng Shiu University, Taiwan

Abstract

Wearable smart technology is growing fast in recent years; also many products like smart watches, smart bands or other format equipment have been introduced into the sports industry. Users could monitor their vital sign status and exercise intensity in real time, helping the coaches and athletes logging their daily training and performance easy and efficient. Pittsburgh sleeps quality index (PSQI) questionnaire and the smart band was used to record athletes sleep quality (SQ) and health monitoring for 4weeks. 16 elite youth weightlifters were participating in this study. Results showed highly correlated between PSQI and SQ, and higher sleep hours did not reflect the good SQ. cooling down work after main course training program including stretching and massage has positive effects on deep sleep. Athletes lifestyle and daily schedule management could be positive effects on their health and performance.

Keywords: G sensor, biosensors, sports health monitoring, performance monitoring
Invited Speaker 7

The Effects of Perceived Autonomy Support and Amotivated Students’ Physical Activity Levels in Elementary School PE Environment

Wen-Yi Wang
Graduate Institute of Sport Pedagogy, University of Taipei, Taiwan

Abstract

The health of today’s Child and youth continues to deteriorate and their physical education (PE) is one way to facilitate student physical activity (PA). It also found that their PA levels in PE were dependent upon the motivation levels of the individuals involved (Erwin, Stellino, Beets, Beighle, & Johnson, 2013). The purpose of this study was to analyze different perceived autonomy support PE environment being a relation to their amotivated PA levels. The participants were sixth-grade students aged 11–12 years (n=106) from a middle socioeconomic status public elementary school in Taiwan. Due to the school system examined in this study, the experimental groups were randomly assigned to whole classes instead of to individual students. Each class was assigned to different autonomy support environment (Control G, n=27; Group A, n=26; Group B, n=27; Group C, n=26) and we filter them based on Vlachopoulos, Katartzi,& Kontou (2013) and Shen et al. (2010) principle of selection approach (amotivated Students’ CG, n=6; Group A, n=8; Group B, n=10; Group C, n=6). Soccer Game play program was designed by 6weeks. Data collection was from multiple sources, which involved "The Elementary school students' Motivation scale in PE ", and" Amotivation Inventory-Physical Education", in pre- and post-test. And 30 ActiGraphwGT3X-BT accelerometers were used in 12 times. The results show that it had significantly different in MVPA % in PE class in 4 different autonomy support environment but no significant difference in AI-PE.

Keywords: Pedagogy, self-determination theory, learning motivation
Self-Perception of Motor Performance in Adults with Developmental Coordination Disorder
Theresa Chyi
Department of Exercise and Health Promotion, Chinese Culture University, Taipei, Taiwan

Abstract

Developmental coordination disorder (DCD) is a situation defined as very poor motor performance without mental or other clinical disease but interferes one’s daily living functions and academic achievements. Purpose of this study was to investigate the self-perception related to motor performance of adults with DCD. Motor performance of participants was evaluated with the Movement Assessment Battery for Children and those score under 10 points were grouped as DCD. Participants included 9 male and 8 female undergraduates who were confirmed with DCD and 17 age- and gender-matched control group. The Chinese version M-ABC checklist for 11-12 year-old level (QA) and the Questionnaire of present motor insight (QB) were used to evaluate self-perception (QA1-4, QB1-4) of motor performance related to 11-12 years old and the present time of participants. Data was presented as mean ± SE and tested with unpaired t-test (α=0.5). The results demonstrated that the scores of QA1-4 (6.6±1.8) and QB1-4 (4.1±1.0) of all DCD were significantly higher than normal controls (2.8±1.1 and 2.0±0.6). Further, the QA1-4 of female DCD (8.8±2.4) was significantly higher than male DCD (4.4±1.2). However, no difference was found in scores of B1-4 between male (3.5±0.8) female (4.7±1.2) DCD participants. The results indicate that since the age of 11-12 years old, DCD adults had become aware of their poor motor performance and the perception could be sustained till young adulthood. In addition, female DCD were more sensitive than DCD males regarding to motor performance at the age of 11-12 years old.

Keywords: developmental coordination disorder; motor performance; self-perception
Invited Speaker 9

Psychology of Sport and Injury Athletes
Naruepon Vongjaturapat
Burapha University
Thailand

Abstract

The reality of physical injuries is that the mind gets damaged too, but little attention is paid to how the absence of “mental rehab” can prevent athletes from returning to or improving on their pre-injury level of performance. As a result, how injured athletes can ensure that their minds recover as fully as do their bodies. This talk aims to identify the mental part of psychology of athletes that affect their performance before and after injury. The investigation of relationship between psychological variables and sport injuries also reviewed. Are there any antecedents and psychology causes of injury? What do we know and how we deal with this relation? The role of sport psychology counselor is an important part to help athletes to recover faster and more efficient. The Andersen and Williams Model is to explain the psychological factors underlying occurrence of sport injuries. The 5 stages of grief also can help you to understand the athletes when they are injury. Finally, the advisable guidelines are provided to those who have to work with injury athletes.

Keywords: Injury athletes, sport psychology, stress and injury model
Workshop 2

Aqua Relaxation Technique (A New Invention of Stress Management Tool)
Lim Boon Hooi
Sports Centre, University of Malaya, Malaysia

Abstract

Stress in performance settings, especially in sports, has been the center of interest for almost a few decades. It continues to be a diversely discussed topic due to its omnipresence in modern general society. The term stress is used to describe a process caused by a demand beyond the level of functioning. Relaxation techniques are probably the most popular stress management methods used in sports. These techniques focus on reducing muscle tension, calming the mind, reducing symptoms of stress, and improving focus. Popular techniques are progressive muscle relaxation, biofeedback, autogenic training, and meditation. Studies have shown that such relaxation techniques are indeed successful in achieving their goals, namely the reduction of stress levels. A less familiar relaxation technique is floatation Restricted Environmental Stimulation Therapy (REST), floatation REST aims at reducing the level of environmental stimulation to a minimum and achieving a sense of near weightlessness through floating in a salt-water solution. It has positive effects on physiology (e.g., lower blood pressure), relaxing, mood and performance enhancing that seem to be more profound than those of other relaxation techniques. The NEW invention of Aqua Relaxation Technique is similar to the REST technique whereby the subject will be floated in the clean water with a life jacket. The advantages of this NEW technique are it enables coaches or sport psychologist to conduct the relaxation session for a group of athletes at once, it can be conducted in an open space especially at the swimming pool and with no extra cost incurred.

Keywords: Aqua Relaxation Technique, New Invention Relaxation Technique
Invited Speaker 10

The Current Research in Guided Imagery and Sports

Garry Kuan

Exercise and Sports Science Programme, School of Health Sciences, Universiti Sains Malaysia, Malaysia

Abstract

Imagery is one of the most powerful techniques for enhancing performance in sport, changing the status of key psychological variables in positive ways, and coping with injury. Because imagery is an unobservable mental process, our understanding of the mechanisms underlying it remains incomplete. In this presentation, I will report on a range of the ways in which we have studied imagery to increase our knowledge about the way it works and our practice of imagery to enhance performance, enjoyment, and well-being in sport. I will consider issues related to the understanding of how imagery works. This includes research on the development and functioning of internal and external imagery perspectives, including their effective use to enhance open and closed skills and the neural processes associated with each perspective. I will then address the key issue of measuring imagery in research and in applied sport psychology work, focusing on the Sport Imagery Ability Measure (SIAM), a scale developed to measure imagery ability. Next, I will consider our research that has addressed the use of imagery to change psychological states, such as in reducing anxiety, and increasing motivation, confidence, and performance in sport. A substantial area of our research has addressed factors that influence the delivery of imagery. I will discuss studies conducted to examine the efficacy of imagery, research that has examined the use of music to enhance the impact of imagery, and the examination of different ways to rehearse imagery content to maximise its effect on performance and self-efficacy. I will conclude by noting how, in all of this research, we have contributed new knowledge to enhance understanding of the ubiquitous imagery process, yet I will emphasise that there is still a great deal of research to be done before we realise the full potential of imagery in sport.

Keywords: Imagery, sports performance, SIAM
Invited Speaker 11

Statistical Analysis in Sport and Exercise Sciences Research
Kueh Yee Cheng
Unit of Biostatistics & Research Methodology, School of Medical Sciences,
Universiti Sains Malaysia, Malaysia

Abstract

Statistics is a science, a branch of mathematics, dealing with the collection, organization, summarization, analysis data and make inferences about a body of data when only a part of the data is observed. The main aim of the statistical analysis is to give a meaningful interpretation to the meaningless dataset. This requires a proper design of the study, selecting the right samples and chosen a suitable statistical test to answer a study objective. An adequate knowledge of statistics is necessary in all quantitative studies. Improper statistical methods may result in erroneous conclusions which may mislead the reader in future. The majority of the sport and exercise research utilizes quantitative type of study, thus statistical analysis on the collected data set is unavoidable. There were many types of statistical analysis and each address different study objective and hypothesis. This presentation covers a brief outline of the basic statistical analysis used in sport and exercise sciences research. Several examples of research will be given in the presentation to guide participants in choosing the right statistical test for different study objective and hypothesis. An appropriate knowledge about the basic statistical analyses will help researchers to improve the quality and precision on their data interpretation and reporting. This knowledge may also guide them in understanding and interpreting the results of published articles.

Keywords: Statistical analysis, exercise science research
Invited Speaker 12

Cost Value and Motivational Climate in Secondary Physical Education
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Abstract

The study examined the cost component of task values in expectancy value model of achievement choice which is one of overlooked component in empirical research and task- and ego-motivational climate in Physical Education. In this context, the purpose of the study was to examine gender, age groups, ethnicity and relationship among students' perceptions of motivational climate and cost value within the expectancy-value model in Physical Education (PE). The participants were 203 secondary school students (18.39 ± 0.62 years). The Motivational Climate in PE Questionnaire and Cost Scale were utilised to measure task and ego involving climate, task effort cost, outside effort cost, loss of valued alternatives and emotional cost. The independent t-test showed that there was a significant difference in outside effort cost between male (4.61 ± 1.61) and female (4.05 ± 1.47); t(201) = 2.33, p = .02. An analysis of variance (ANOVA) yielded a statistically effect on emotional cost, F(2,200) = 4.16, p = .02. A post hoc Tukey test showed that there was significant difference between 18 and 19 years old participants (p = 0.030). However, an analysis of variance (ANOVA) revealed no significant differences in ethnicity except for emotional cost, lost of valued alternatives, and cost value. Post hoc multiple comparisons using Tukey indicated that there were significant differences between Malay and Chinese (p = 0.002) and Chinese and Bumiputera (p = 0.048) on lost of value alternatives. There were also significant differences between Malay and Chinese (p = 0.007), Chinese and Bumiputera (p = 0.034) on cost value. There were also significant differences between Malay and Chinese (p = 0.004), Chinese and Bumiputera (p = 0.002) on emotional cost. Pearson's correlation revealed significant correlation between task climate with outside effort cost, lost of valued alternatives and emotional cost. There were also significant correlation between task effort cost with outside effort cost, lost of valued alternatives and emotional cost. There were also significant correlation between lost of valued alternatives with emotional cost. The PE curriculum need to focus on a positive and supportive task-oriented motivational climate that can provide meaningful learning experiences and opportunities which can motivate the students to engage in physical education.

Keywords: cost value, motivational climate, physical education
**Invited Speaker 13**

**Significance of 1Student 1Sport Policy**
Mehander Singh Nahar Singh
Sports Division, Ministry of Education Malaysia, Malaysia

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**Abstract**

The implementation of 1Student 1Sport Policy (1M1S) is one of the initiatives of the Ministry of Education Malaysia (MOE) towards producing a generation that can engage actively in sports activities. Students are given the opportunity to master skills and knowledge in sports through a “learning-through play” based approach. This policy is one of the key elements in the implementation of “Sports for All” and “Sports for Excellence” in schools. “Sports for All” emphasizes on the development of a society that embraces the culture of sports and the culture of healthy living whereas “Sports for Excellence” focuses on developing student athletes towards achieving excellence in sports at various levels. Relatively, a number of platforms such as the Talent Identification and Development (TID) program that identifies potential students in various sports to be developed and nurtured towards achieving high performance in various sports. Accordingly, schools are also expected to implement six (6) main activities which include (i) Cross country training and competition, (ii) Standard sports, (iii) Track and Field training & competition, (iv) Training and inter house games competition, (v) Training and inter class competition and (vi) Training and preparation of the various school games teams. Malaysia has successfully emerged as the overall champion for the 2017 South East Asia Games. A total of 140 student athletes and 5 teacher athletes were selected to represent Malaysia in the tournament and performed astoundingly well by achieving 38 gold medals, 15 silver medals and 20 bronze medals thus bringing pride to the Ministry of Education. In the Malaysian context for the last 60 years, the school system has always been continuously responsible in producing athletes. The role of the Education Ministry specifically the schools will always remain relevant in the development and success of sports in Malaysia.

**Keywords:** policy, sport activities, learning-through play, talent identification
Invited Speaker 14

Decision Making in Pressured Competition Situation: A Study from the Field of Elite Sports
Philip Lew Chun Foong
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Malaysia

Abstract

"The more confidence you can give them in leading the team, in making decisions on the field, the better they’re gonna play. Also it makes them feel good, it’s good for their self-esteem." This was an insightful statement highlighted by Graham Henry, the head coach of the all-conquering New Zealand All Blacks Rugby team (Paul, 2012; SkyTV). The interactive and continuous nature of team sports require athletes to switch between attack and defense numerous times during a game, concentrate on the designated roles essential for their playing position and the team game plan (Hodge, Lonsdale, & McKenzie, 2005). Athletes are required to make tactical decisions on the move during pressured situation in the game without direct support from coaches, therefore the importance of optimal in-game decision-making becomes paramount (Hodge et al., 2005). In this presentation, the effectiveness and impact in administering electronic applications in training, which are an electronic version of the concentration grid exercise and the Flip Flop Reflex Tester, are being highlighted. Besides acknowledging the properties in enhancing concentration, the emphasis on identifying the athletes' competency in reaction time, handling distraction, performing under pressure, goal settings and predicting performance provided an insight into the developmental process of enhancing decision making in competitive situation of elite sports settings.

Keywords: Decision making, competitive, pressure, elite sports, Malaysia
Section 2

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**Full Conference Paper 1**

**Investigating Athletic Mental Energy: What it is? And How it measured**

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**Abstract**

Mental energy is defined as "...maintaining long hours of working with high attention on a given task (Cook & Davis, 2006)." However, the idea of athletic mental energy (AME) has never been conceptualized and studied. The purpose of this workshop was to conceptualize athletic mental energy and develop an initial measuring tool. We use both quantitative and qualitative methods to conceptualize the concept of "athletic mental energy (AME)." Results showed AME is defined as "an athlete’s perception on existing state of energy which is characterized by having high motivation, high sport spirit, high confidence, high concentration, high vigor but low anxiety. By using item analysis, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), a 6-factor, 34-item athletic mental energy scale (AMES) has been developed with adequate content validity, factorial validity, and internal consistency. Future research directions are suggested. Also, possible applications are provided.

**Keywords:** elite athlete, psychology of sports excellence, concentration, optimal state of mind, sport confidence

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**INTRODUCTION**

By its simplest definition, energy is defined as “the capacity to work.” In the universe, there exist all types of energy - from solar energy, chemical energy, hydraulic energy, wind energy, to biological energy. In general psychology, researchers also concern human mental energy. Mental energy is defined as the “Maintaining long hours of working with high attention on a given task (Cook & Davis, 2006)” or “continuing long hours of thinking, concentrating attention, and blocking distractions (Lykenn, 2005).” It is also suggested that an individual’s mental energy influences one’s academic works, athletic performance, commitment, and sales performance (Cook & Davis, 2006).

Although mental energy is important to human functioning very few studies attempted to conceptualize it and offered a reliable and valid measure. For example, the North American Branch of International Life Science Institute (ILSINA) has proposed a conceptual model of mental energy and suggested that mental energy should include 5 dimensions: motivation, cognition, quality of life, mood and sleep but they did not provide a valid and reliable measure. All researchers follow this suggestion by using either SF-38 (O’Connor, 2006),
Clinical records (Lieberman, 2006; 2007), or profile of mood state (POMS), 1-item for memory test, reaction time, attention, and digital coding (e.g., Gorby et al., 2010) as way of assessing mental energy. However, this arbitrarily borrows an existing scale from other area is not appropriate which may cause conceptual and methodological confounding.

**Athletic Mental Energy Study in Sports**

In sports, the researcher also mentioned on athletic mental energy. For example, in his classical textbook of athletic mental training, Robert Nideffer (1985) mentioned that a certain type of mental training derived from Aikido is that Aikido players focused their attention on the center of navel when controlling breathing. By such practice, Nideffer proposed that Aikido players will feel centered, controlled, and full of energy. Similarly, Richard Suinn (1986), a famous American Sport Psychologist, who create a mental training skill called “Visual Motor Behavior Rehearsal (VMBR).” In his textbook titled “Seven Steps to Peak Performance,” Richard claimed that athletes will feel full of energy when they use VMBR to guide their energy from body to sporting arena.

Although both from general psychology and sport psychology mention many ideas about mental energy, there is lack of conceptualization and a theoretical rigor measure of mental energy.

**Purposes of the Study**

a. Defining and conceptualizing the athletic mental energy (AME).

b. Developing a measuring tool of AME.

**METHODS**

**Study 1**

**Purposes.** The purpose of study 1 was to develop the concept of Athletic Mental Energy (AME) and propose a tentative theoretical framework.

**Methods.** We used in-depth interview and quantitative survey to gain a consensus on the definition of AME. Also, a quantitative survey by sampling 250 college student-athletes we used an open questionnaire to ask them about the experiences of having athletic mental energy.

**Results.** Qualitative exploration defined AME as an individual’s perception of his/her existing energy state which is characterized by having an optimal experience of emotions, confidence, motivation, and concentration. Quantitative survey yields 932 first order themes, which in turn categorized as 13 second-order themes (sub-categories). Then, the 13 second-order themes were categorized as 6 major categories of AME termed high motivation, high confidence, high vigor, highly concentrated, high sports spirit, and low anxiety as figure 1 indicated.
Study 2

**Purposes.** The purpose of study 2 was to construct an initial questionnaire for assessing AME and examine its preliminary psychometric properties.

**Methods.** We generated 60 items from study 1 by identifying the most frequently cited experiences of AME by the participants at the quantitative survey of the study 1. Then, we asked experts to review the appropriateness of the questionnaire draft. The third step is to test in the field. We used item analysis, Exploratory Factor Analysis (EFA) and Cronbach\(\alpha\) coefficients.

**Results.** Item analysis found 58 items were suitable for further analysis. An EFA showed the Athletic Mental Energy Scale (AMES) has 34 items with 6 dimensions, and the accounted variance was 62.79%. Cronbach’s\(\alpha\) for all factors were ranged from .776-.913.

**DISCUSSION**

By two studies we obtain a reliable and valid athletic mental energy scale termed AMES with initial reliability and validity. However, this is only the beginning of the athletic mental energy. More psychometric properties (e.g., construct validity, test-retest reliability) must be examined. Also, Cross-cultural validation is needed. Future study may investigate what factors influence AME, or what PST/interventions may enhance AME.

**REFERENCES**


Effects of PETTLEP and NLP-PETTLEP Imagery Scripts on Self-Confidence Score among Novice Archers

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Abstract

Neuro-Linguistic Programming (NLP) is a psychology model that studies the interaction between mind and language. The emphasis of NLP is manipulating the process of information. Because imagery could enhance athletic performance and, self-confidence of the athletes, it should be helpful to examine the efficacy of NLP on self-confidence of the participants. This study examined the influence of imagery script based on NLP-PETTLEP for enhancing the confidence of novice archers and comparing it with PETTLEP imagery script. Participants were novice archers (PETTLEP: n=12, NLP-PETTLEP: n=15) with moderate imagery ability measured by the Sport Imagery Ability Measure (SIAM). Participants in both groups participated in two introductory sessions. They learnt, i) the principles of the interventions and ii) the ten basic steps in archery performance. At the end of the second session, participants also performed a 20-shot shooting trial to practice what they learnt. We employed a pre-test-intervention-post-test design with 20-trial 18m archery shooting performance before and after ten sessions of either PETTLEP or NLP-PETTLEP imagery scripts over five weeks before the post-test was conducted, together with completing the Sport Self-Confidence Inventory (SSCI). Participants listened to the script twice per week, with the first session in the sport laboratory and the second session at home with an mp3 player. Based on the data obtained, the PETTLEP imagery was lower in self-confidence score compared to NLP-PETTLEP (M = 68.42, SD = 11.39; M = 70.13, SD = 12.14), independent sample t-test showed no significant change in both groups (t = -.375 = 25; p = .711, eta = 0.12). One reason could be using PETTLEP as an additional to NLP imagery principles may impose an inessential cognitive task on participants. Considering participants of this study were the novice in archery, the adopted imagery intervention involved them with additional complex cognitive skills instead of merely affecting their performance confidence.

Keywords: NLP, PETTLEP, archery, imagery script

INTRODUCTION

Recent literature indicates that the use of Neuro-linguistic Programming (NLP) is becoming more popular in the applied and clinical settings like, education, clinical psychology, and medical settings (Knight, 2012; Karunaratne, 2010; Hemmati, Farhadi, & Fereidoni, 2016). Besides, there are also increasing interests in employing NLP as a psychological intervention for enhancing athletes’ performance (Jeffreys, 2006; Witkowski, 2010). NLP is
an interdisciplinary approach to cognitive-behavioural psychology that focuses more on studying language and thoughts in altered states of consciousness. This model studies about mental representation and human behaviour, and how some people are more generative compared to others who are experiencing the same conditions with no notable results. The primary focus of NLP is on improving human performance. Optimal performance from NLP perspective is the study of how individuals' thoughts, emotions, and behaviours could affect their performance while doing a physical or/and cognitive task (Dilts & DeLozier, 2000; Wake, 2008).

NLP operates on the cognitive level, designed to change human performance through working with the structure of thoughts. This model focuses more on making changes in the structure of thoughts, which are known as the sub-modalities, which in turn contributes to changes in the meaning of thoughts. This change, in turn, affects individuals' understanding of their mental representations (Kong, 2012). That is, more functional meanings come from restructuring thoughts instead of focusing on reinterpreting their contents as it often happens in traditional cognitive behavioural therapy approaches (Bandler, Grinder, & Andreas, 1982).

In this study, we believe that thorough evaluation of NLP-based mental imagery as proposed here by our guiding audio script could help to move forward the understanding of the underlying mental imagery processes across athletes' self-confidence, and help drive forward the advances in both theory and practice. Also, we validated the results of NLP-based imagery intervention through comparing its effect to the PETTLEP model as one of the effective mental imagery models which have frequently been investigated over the last two decades.

METHOD

This study evaluated the influence of imagery script based on the NLP-PETTLEP principles for enhancing novice archers' self-confidence and comparing it with the PETTLEP imagery script. Participants were novice archers (PETTLEP: n=12, M= 20.08, NLP-PETTLEP: n=15, M= 20.60) with moderate imagery ability measured by the Sport Imagery Ability Measure (SIAM). Participants in both PETTLEP and NLP-PETTLEP groups participated in two introductory sessions. They learnt, i) the principles of the interventions and ii) the ten basic steps in archery performance. At the end of the second session, participants also performed a 20-shot shooting trial to practice what they learnt. The study employed a pre-test-intervention-post-test design with 20-trial 18m archery shooting performance before and after ten sessions of either NLP-PETTLEP or PETTLEP imagery scripts over five weeks before the post-test was conducted, together with answering the Sport Self-Confidence Inventory (SSCI). All participants listened to the imagery script twice per week, with one session in the sport laboratory and the other session at home with an mp3 player.

INTERVENTION

In this study, as for NLP-PETTLEP imagery script, the same PETTLEP elements of imagery were involved with it. As a result, this script was named as NLP-PETTLEP. In terms of the PETTLEP group, because of the lack of access to the archery clothes and its accessories in all imagery training sessions in the sport laboratory (first imagery training session in each week) and at their home (second imagery training session in each week), the two first elements of the PETTLEP model, Physical and Environment, were added to imagery scripts of archery shooting so that participants were taught to imagine the Physical and Environment elements during listening to the audio scripts. In general, the two archery
shooting imagery scripts focused on executing the archery task of shooting arrows at a concentric circles target with the aim to hit the "X" ring, including feeling the weight of the bow, gripping the bow, looking at the "X" ring of the archery matt, imaging the distance between the archery matt and the standing mark on the floor from which arrows were to be shot, and releasing the arrow towards the archery matt accurately when participants ready. To build the confidence of the participant during mental imagery of skill production (Morris, Spittle, & Watt, 2005), the participants were taught in to picture a successful archery performance when listening to the imagery scripts. Participants were instructed to imagine their arrow hitting close to the centre of the target. The imagery training consisted of 10 sessions, with approximately 13 minutes for each session. Considering the nature of NLP and PETTLEP models of working with mental imagery, there was an instruction about how many times the act of releasing an arrow at the target was to be imagined.

RESULTS

The results of this study were presented in table 1, the analyses showed that the PETTLEP imagery was lower in self-confidence compared to NLP-PETTLEP (M = 68.42, SD = 11.39; M = 70.13, SD = 12.14).

However, based on the results, the independent sample t-test revealed that there was no significant difference in both research conditions (t_{37} = 25; p = .711, eta = 0.12).

Table 1. Independent samples t-Test Result Comparing PETTLEP and NLP-PETTLEP on Self-Confidence.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>Mean diff. (95% CI)</th>
<th>t-statistics (df)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PETTLEP (n=12)</td>
<td>68.42 (11.39)</td>
<td>70.13 (12.14)</td>
<td>1.717 (-7.71, 11.14)</td>
<td>.375 (25)</td>
</tr>
<tr>
<td>NLP-PETTLEP (n=15)</td>
<td></td>
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</tbody>
</table>

DISCUSSION

The present study was designed to determine the effect of the NLP-PETTLEP imagery script on novice archers’ self-confidence by comparing with the PETTLEP imagery model. The current study found that there was not a significant difference between the level of self-confidence of both PETTLEP and NLP-PETTLEP groups. Considering we had added PETTLEP imagery model elements to the NLP-based imagery script, it was predicted that this addition might cause the tailored NLP script shows its efficacy, resulting in a higher self-confidence level compared to the PETTLEP group. However, this finding suggested that there was no significant difference between the self-confidence score of PETTLEP and NLP-PETTLEP imagery scripts. One possible explanation for this result may be due to the fact that the participants were the absolute novice in archery shooting, and employing a complicated imagery script combining NLP principles of mental imagery and the seven elements of PETTLEP imagery model, may have caused difficulties for the participants in using their mental images to affect their confidence level. Another possible reason could be a possible incompatibility between the NLP principles of mental imagery and the PETTLEP model which indicates further studies on the use of NLP-PETTLEP should be encouraged. Third, the limiting NLP principles focusing on changing self-confidence in the imagery scrip. This caused some critical components of this model were dismissed, for example,
establishing rapport with participants, individualising the imagery intervention based on the need of the participants, and working with mental images using the one-to-one NLP principles, which typically are employed during the intervention sessions.

CONCLUSION

This study examined the efficacy of PETTLEP and NLP-PETTLEP model of mental imagery on the self-confidence among the novice archers. This study showed that there is no significant difference in self-confidence scores between the two research conditions. The evidence from this study suggests that using NLP-based imagery intervention with PETTLEP components to work with a group of novice athletes would not affect their level of self-confidence comparing to the effect of PETTLEP imagery model alone. Further research might explore the efficacy of NLP-based imagery intervention in an individualised manner to let the practitioner tailor the intervention based on the needs for the participants. Besides, it would be important to examine the efficacy of NLP model as an independent intervention to have a better understanding of its mechanism rather than using together with the PETTLEP imagery.

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REFERENCES


Abstract

Mental toughness is a term that is often used to describe a collection of psychological characteristic thought to be central to high performance. Over the last decades, numerous studies have showed that mental toughness plays a significant role in successful performance. However, most early research into the effects of mental toughness was merely descriptive, and only recently were the theoretical and systematic bases of mental toughness structure and concepts significantly established. Additionally, previous studies were based on a variety of measurements and research designs focusing on mental toughness and concepts, resulting in a number of different points of view. The purpose of this study is to review some of the emerging definitions and conceptualisations and examine how mental toughness might be developed in performers. Qualitative and quantitative approaches to the study of mental toughness are evaluated, and developments in measuring this important concept are discussed. This review focus including the contemporary mental toughness research applying qualitative approaches and quantitative approaches. Conclusion and future research recommendations in these areas are discussed. Although these discussions center on the general of mental toughness, we believe many of the issues have relevance to scholars and practitioners interested in the measurement of psychological variables as they pertain to sport, exercise, and other performance or achievement contexts.

Keyword: mental toughness, psychological skill

INTRODUCTION

An athlete's success or failure is dependent on the combination of physical and psychological abilities. Psychological factors had been accepted through all over the world as one of the influential factors in sport (Brewer et al., 2009). It was also supported by Ragab (2015), that stated: “it is widely accepted that sport performance is also influenced in great measure by psychological factors”. Recently coaches, sport psychologists, parents and even the media are concerned about the athlete's psychological ability or psychological quality. According to Gould, Hodge, Peterson, and Petlichkoff (1987), coaches reported that the psychological attributes of mental toughness were judged to be the most important for success in wrestling (rated as 82%). It was supported by Gould, Dieffenbach, and Moffett (2002) study on the learned skills to attain peak performances among ten Olympians. One of the highest ranked psychological characteristics reported by Olympic champions was mental toughness.

Athletes, coaches, and applied sports psychologists have consistently referred to mental toughness as one of the most important psychological characteristics related to
outcomes and success in the elite sport, although researchers have, until recently, devoted little time to studying this concept (Crust, 2007). According to Jones (2002), mental toughness is probably one of the most used but least understood terms used in applied sport psychology. In order to further understand the development of contemporary mental tenacity research, the purpose of this manuscript is to review those studies examining the relationship between mental toughness and sports performance, as well as focusing on the following two specific sections including the contemporary mental toughness research applying qualitative approaches and contemporary mental toughness research using quantitative approaches. Conclusion and future research recommendations in these areas will also be discussed.

CONTEMPORARY MENTAL TOUGHNESS RESEARCH APPLYING QUALITATIVE APPROACHES

In a pioneering qualitative study of mental toughness, Fourie and Potgieter (2001) analysed written responses from 131 expert coaches and 160 elite athletes. Coaches and elite athletes responded to a series of open-ended questions requiring them to provide their best definitions and descriptions of mental toughness. Fourie and Potgieter’s analyses of these written responses identified twelve components of mental toughness, including: motivation level, coping skills, confidence maintenance, cognitive skills, discipline and goal-directedness, competitiveness, possession of prerequisite physical and mental requirements, team unity, preparation skills, psychological hardiness, and ethics. Jones et al. (2002) published the results of a qualitative study examining mental toughness on ten elite international athletes. Their research aimed to define mental toughness and to determine the essential attributes required to be a mentally tough performer. The definition that emerged from their analysis was:

Mental toughness is having the natural or developed psychological edge that enables you to:

1) Generally, cope better than your opponents with the many demands (competition, training, lifestyle) that sport places on a performer; and

2) Specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure.

As a result of an inductive thematic content analysis, twelve key attributes of mental toughness were also identified such as having an unshakable self-belief in your ability to achieve your competition goals; bouncing back from performance setbacks as a result of increased determination to succeed; having an unshakable self-belief that you possess unique qualities and abilities; having an insatiable desire and internalised motives to succeed; remaining fully-focused on the task at hand in the face of competition specific distractions; regaining psychological control following unexpected, uncontrollable events (competition-specific); pushing back the boundaries of physical and emotional pain, while still maintaining technique and effort under distress (in training and competition); accepting that competition anxiety is inevitable and knowing that you can cope with it; thriving on the pressure of competition; not being adversely affected by others’ good and bad performances; remaining fully-focused in the face of personal life distractions; and switching a sport focus on and off as required.

Bull et al. (2005) focused specifically on mental toughness in cricket players. They addressed two main objectives: to obtain a better understanding of what mental toughness is within cricketers and to identify how existing mentally tough English cricketers developed their mental toughness. They used qualitative procedures to interview 12 mentally tough cricketers (101 English cricket coaches having identified the most mentally tough cricketers of the previous 20 years). From their results, they presented a complex model of mental toughness that included four structural categories, each containing a number of themes related to overall
mental toughness. These include environmental influence: parents, childhood, the need to earn success, opportunities to survive early setbacks, exposure to foreign cricket; tough character: resilient confidence, independence, self-reflection, competitiveness with self as well as others; tough attitudes: never-say-die mindset, go-the-extra-mile mindset, thrive on competition, belief in making a difference, exploit learning opportunities, willing to take risks, belief in quality preparation, determination to make the most of ability, self-set challenging targets; and tough thinking: thinking clearly-making good decisions, keeping perspective, honest self-appraisal and robust self-confidence-overcoming self-doubts, feeding off physical conditioning, maintaining self-focus.

Next, Thelwell, Weston and Greenlees (2005) with a sample of male professional soccer players, all with international experience on mental toughness. Regarding the latter study, when asked to compare their soccer-specific definition and understanding of mental toughness with that proposed by Jones et al. (2002), minor differences were identified. The soccer sample viewed mental toughness as enabling players to “always” cope better than their opponents rather than “generally” cope better, likewise they identified only ten attributes as opposed to Jones et al.’s (2002) twelve. Adopting similar investigative techniques, Jones, Hanton and Connaughton (2007) conducted a follow-up study using a sample of super-elite sports performers (i.e., Olympic/World Champions) to expand the mental toughness knowledge base, and broadened the scope by including the perceptions of coaches and sport psychologists who had coached and consulted at that level. Results verified their earlier definition of mental toughness, and in doing so, also extended the list of attributes considered essential to the make-up of mental toughness to 30. These were subsequently categorised into 13 sub-components of mental toughness, which were then organised into a framework of mental toughness comprising four dimensions: a general Attitude/mindset dimension, and three time-specific dimensions, Training, Competition, and Post-competition.

In assessing the knowledge base of mental toughness, Gucciardi, Gordon and Dimmock (2009a) employed Personal Construct Psychology (PCP; Kelly, 1955/1991) as a theoretical framework to construct the following definition: “Mental toughness is a collection of experientially developed and inherent sport-specific and sport-general values, attitudes, behaviours, and emotions that influence the way in which an individual approaches, responds to, and appraises both negatively and positively construed pressures, challenges and adversities to consistently achieve his or her goals” (p. 278).

Whilst Gucciardi and colleagues (2008; 2009; 2010) did not offer a definitive perspective on the key values, attitudes, cognitions and emotions, investigations into the sport-specific components of mental toughness related to Australian rules football (Gucciardi, Gordon & Dimmock, 2008), cricket (Gucciardi & Gordon, 2009) and soccer (Coulter, Mallett & Gucciardi, 2010) highlighting the emergence of a core group of key mental toughness facets that do not vary significantly by sport (e.g., self-belief, self-motive, attention control, resilience).

CONTEMPORARY MENTAL TOUGHNESS RESEARCH USING QUANTITATIVE APPROACHES

Loehr (1986) constructed the initial mental toughness measurement tool, the Psychological Performance Inventory (PPI). This questionnaire was developed to operationalise Loehr’s (1982) definition of mental toughness, which suggested that mentally tough athletes had learned or developed two important skills: first, the ability to increase their flow of positive energy when faced with adversity or a crisis; and second, to think in ways that promote the right attitudes to solve problems, or to deal with pressure, mistakes, or competition. The PPI contains 42 items and measures mental toughness via the seven
subscales of Self-confidence, Negative Energy, Attention Control, Visualisation and Imagery Control, Motivation, Positive Energy, and Attitude Control. Each subscale contains six items, each scored on a 5-point Likert scale, with scores for each subscale ranging from 6 to 30, and for total mental toughness ranging from 42 to 210. A number of studies (e.g., Golby, Sheard, & Lavallee, 2003; Golby & Sheard, 2004; Kuan & Roy, 2007; Lee, Shin, Han, & Lee; 1994) have employed the PPI as a measure of mental toughness.

In contrast to the PPI, Clough et al. (2002) developed the Mental Toughness Questionnaire 48 (MTQ 48) to work their own 4 C’s model of mental toughness. The MTQ 48 contains 48 items that are scored on a 5-point Likert scale ranging from (1) strongly agree to (5) strongly disagree, with an average completion time between 10 and 15 minutes (Crust & Clough, 2005). The MTQ 48 has an overall test-retest coefficient of 0.9, with the internal consistency of the subscales (Control, Commitment, Challenge and Confidence) found to be 0.73, 0.71, 0.71, and 0.8 respectively (Clough, et al., 2002). Connaughton et al. (2008), however, advised that the MTQ 48 findings Clough et al. reported should be interpreted with caution because the rationale for the conceptualisation of MT is essentially based on hardiness and confidence constructs and there was no demonstration of validity even if a sound conceptualisation was apparent. Validity is evidence that a scale measures what it says it measures, and so there is a need for criterion and construct validity to demonstrate that.

With the analyses revealing a lack of support for the hypothesised factor structure of the original PPI (Loehr, 1986), Golby et al. (2007) subsequently developed the Psychological Performance Inventory-Alternative (PPI-A), which represents four factors of MT, namely determination, self-belief, positive cognition, and visualisation. Golby et al. used the responses (N = 408) from their original PPI study to generate the PPI-A. After using principal component analysis to find structure in their data, they used confirmatory factor analysis to assess the psychometric structure of the model. Then, Sheard (2009) used the PPI-A to investigate national differences in mental toughness between rugby league players in the United Kingdom and Australia. The results from this study indicated that significant differences in mental toughness were apparent between national teams. Although these findings are based on a small sample size, Sheard concluded that these findings provided evidence for the divergent (or discriminant) validity (i.e. does not correlate too much with similar but distinct constructs) of the PPI-A.

Middleton, Marsh, Martin, Richards, and Perry (2004b) constructed the Mental Toughness Inventory (MTI) 36-item based on a model of mental toughness developed from themes that emerged from their qualitative study. The MTI was designed to measure the 12 characteristics Middleton et al. (2004a) proposed, namely: self-efficacy, future potential, mental self-concept, task familiarity, value, personal best motivation, goal commitment, task-specific attention, perseverance, positivity, positive comparisons, and stress minimisation, which are summed to produce a global mental toughness score. The self-report MTI is an 8-point response scale where respondents rate statements from 1 (not like me) to 8 (like me). Middleton et al. (2011) reported that the MTI is strong on conceptual grounds with strong psychometric properties and high reliability. Although the MTI appears to have a strong theoretical base, using elite high school athletes with a mean age of 14 years to validate the instrument may mean its use with other populations could be questionable (Sheard et al., 2010).

Sheard, Golby, and van Wersch (2009) then developed the Sport Mental Toughness Questionnaire (SMTQ). Two independent studies supported a three-factor (Confidence, Constancy, and Control) 14-item model for the SMTQ. With a sample of 633
athletes (427 males, 206 females; \( M \) age = 21.5 years; \( SD = 5.48 \)), drawn from 25 sport classifications, and competing at international, national, county and provincial, or club and regional standards, the first study utilised item development and exploratory factor analytic techniques to establish the psychometric properties of the SMTQ. In their study 2 employed confirmatory factor analytic techniques with an independent sample of 509 sports performers (351 males, 158 females; \( M \) age = 20.2 years; \( SD = 3.35 \)), competing at the aforementioned standards, and representative of 26 sports. Confirmatory analysis using structural equation modelling confirmed the overall structure. A single factor underlying mental toughness was identified with higher-order exploratory factor analysis using the Schmid-Leiman procedure. Collectively, satisfying absolute and incremental fit-index benchmarks, the inventory was shown to possess satisfactory psychometric properties, with adequate reliability, divergent validity, and discriminative power.

Gucciardi, Gordon, and Dimmock (2009b) used the wealth of information from their previous study (Gucciardi et al., 2008) to develop a pool of 60 items for their 11-factor model of mental toughness. Gucciardi et al. (2009b) carried out a confirmatory factor analysis with 418 footballers and found the 11-factor model did not fit the data well. The authors then performed a series of principal component analysis (PCA) using both varimax and promax rotations to explore the usefulness of three-, four-, and five-factor solutions. These analyses supported a 24-item four-factor model (thrive through challenge, sport awareness, tough attitude, desire success), which they labelled the Australian Football Mental Toughness Inventory (AFMTI). Gucciardi et al. (2009b) found that the 24-item AFMTI did not fit the data with a sample of 350 youth Australian footballers. Additionally, the data from the original investigation, reported in 2008, identified 11 characteristics of MT in Australian football from interviews with 11 elite coaches. Reducing the data to a four-factor model raised concerns regarding the breadth of the construct, and Gucciardi et al. (2011) concluded that further work is required to address these concerns.

Next, Gucciardi and Gordon (2009b) conducted a series of studies within a mixed-methods framework to develop their Cricket Mental Toughness Inventory (CMTI). Interviews with 16 cricketers from two countries, five of whom were still involved in international cricket at the time of study to develop another model of mental toughness for cricketers. A six-factor model emerged from the interviews, and two independent focus groups with nine Australian cricketers resulted in minor modifications to the wording and the addition of eight items. Gucciardi and Gordon (2009b) administered the six-factor inventory to a general sample of cricketers from international leagues \( (n = 570) \) and a sample of Australian cricketers \( (n = 433) \). There was an equal split of the total sample for either a calibration or cross-validation analysis. One factor (i.e., 56 cricket smarts) was removed following a series of confirmatory factor analyses with the calibration sample, which provided support for the 15-item, five-factor model. Gucciardi (2011) found support for the validity of the CMTI measurement model by confirmatory factor analysis and internal reliability analysis. Gucciardi (2011) and Gucciardi and Gordon (2009a) provided preliminary support for the factor structure, internal reliability, and construct validity of the CMTI.

**CONCLUSION AND FUTURE RESEARCH RECOMMENDATIONS**

From the above review, we can see that mental toughness plays an important role in competitive sports. However, most early research into the effects of mental toughness was merely descriptive, and only recently were the theoretical and systematic bases of mental toughness structures and concepts significantly established. Although both qualitative (Fourie & Potgieter 2001; Bull et al., 2005; Jones et al., 2002; Middleton et al., 2004a; Thelwell et al, 2005; Gucciardi, Gordon & Dimmock, 2008) and quantitative approaches (Loehr, 1986; Clough et al., 2002; Crust & Clough, 2005; Golby et al., 2007; Middleton, 2007; Sheard et al.,
2009; Gucciardi et al., 2009b; Gucciardi & Gordon, 2009) have been used to understand mental toughness, and some differences of opinion are evident in regards to conceptual issues and measurement, some areas of agreement are also apparent. One of the key advances toward a greater understanding of mental toughness appears to be the development of valid and reliable measurement instruments. Past studies have attempted to use other psychological variables such as emotions, affections, perceptions or pains as a potential mechanism for psychological mental toughness in competitive sports situations. Therefore, this issue should be considered as the future direction of the study because there is still space for further development of potential mechanisms for confirmation.

REFERENCES


Full Conference Paper 4

Implementing Physical Activity in Malaysian Schools: A Review
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Abstract

This study attempts to review physical activity interventions in Malaysian schools that are quasi-experimental based. The databases used during the literature search were ScienceDirect and PubMed ranging from 2012 until 2017. A total of five interventions were found. Firstly, EPaL provides students with cognitive and behavioural skills to effect changes in targeted behaviours by aiming to alter disordered eating behaviour, promote physical activity, prevent sedentary lifestyle and enhance eating behaviours. In addition, the integration of the transtheoretical framework improves adherence. Circuit training was also use in three other studies during physical education classes. The results showed significant improvements in: reduction of BMI before (N = 26.24, SD = 2.29) and after (N = 24.88, SD = 2.28) the interventions; main effect in cardiovascular endurance $F(1, 83) = 44.69, p > 0.05$ and flexibility $F(1, 83) = 46.80, p < 0.05$ while; insignificant for muscular strength $F(1, 83) = 3.54, p > 0.05$. Findings from The Healthy Lifestyle Program Manual National Service study showed that there were significant reduction in weight before (N = 24.91, SD = 0.9) and after (N = 23.60, SD = 0.9) the intervention. Limitations for these studies include lack of randomisation in classes and non-compliance to progressive overload principle. In short, due to lack of longitudinal quasi-experimental research designs, physical activity intervention in Malaysia is still needed in order to support school-based physical activity initiating policies to promote more regular access to physical activity in school settings.

Keywords: Physical activity, Malaysia school, intervention

INTRODUCTION

Physical activity is defined as any bodily movements by the skeletal muscles that result in energy expenditure (Caspersen, Powell, & Christenson, 1985). A subset of physical activity is exercise, which is defined as physical activity that is planned, structured, repetitive and purposeful in order to improve or maintain one or more components of health or skill related fitness. Health-related fitness consists of five components: cardiorespiratory endurance, muscular endurance, muscular strength, body composition and flexibility. Skill-related fitness, however, consists of six components: agility, balance, coordination, power, reaction time and speed. These components make up the attributes of physical fitness (Caspersen et al., 1985).
Physical inactivity is the fourth leading cause of death worldwide accounting for six to ten percent of all non-communicable deaths (Kohl et al., 2012). Physical inactivity increases the risk of diabetes, cardiovascular diseases, hypertension, overweight and obesity. Over the past three decades, the number of people with diabetes mellitus has increased more than doubled globally (Chen, Magliano, & Zimmet, 2012), while worldwide prevalence of overweight and obesity has risen to 39% and 13% respectively in almost the same amount of time (World Health Organisation, 2016). Physical inactivity is also claimed to be the leading cause of hypertensive illness and is estimated to cause two million deaths per year (World Health Organisation, 2016).

Implementing physical activity in schools

For children aged five to twelve years old, participation in at least sixty minutes of moderate to vigorous physical activity per day is essential for their healthy growth and development (Nathan et al., 2017). Schools have been recommended as a key setting for the delivery of population-wide physical activity initiatives as they provide almost universal access to children (World Health Organisation, 2008). As such, many governments have released guidelines or policies mandating a minimum accumulated time or intensity schools are to schedule a structured physical activity for children (Hardman, 2008; Harrington & et al., 2014; Masse, Naiman, & Naylor, 2013; NSW Government, 2015).

A study that undertook observations of 154 physical education lessons found that only 5% of schools in the United States adhered to mandated state policies that require 100 minutes of physical education to be taught each week (Thompson, Linchey, & Madsen, 2013). In Canada, a study found that 43% of elementary school teachers reported implementing the mandatory daily 30 minutes of physical activity policy (Masse et al., 2013). Furthermore, the status of Malaysian schools undergoing regular physical education indicate low mean scores for health-related fitness components (Balakrishnan, 2003; Kasmini et al., 1997; Rengasamy, 2003; Singh, 2005; Sinnapan, 2006). The incidence of obesity has tripled in Malaysia since 1996, with one third of the adult population currently overweight or obese. Perhaps more alarming is the increase in overweight children; over the past 20 years, this rate has risen from 6% to 29% (Ministry of Health, 2011). In addition, Manan, Norazawati, and Lee (2012) stated that 13.1% of primary school students in Kota Bharu face the problem of obesity. Research consistently indicates that schools fail to implement mandatory physical activity policies due to: lack of environmental resources such as equipment, time and staff; perceived priority of schools that adopt policies that gear students more towards academic achievement rather than physical education; social influences such as lack of support from school board to promote physical activity interventions, inadequate skill of the teachers to implement physical activity interventions (Nathan et al., 2017).

Justification for review

An interventional strategy for physical activity promotion that was identified as cost-effective is a school-based interventions for children and adolescents (Abu-Omar et al., 2017). The school environment is ideal for implementing physical activity interventions due to the possibility to reach a wide number of children who are spending most of their time in schools (Hills, Dengel, & Lubans, 2015). Presently, research on implementation of school-based physical activity programs indicate a positive improvement of cognitive skills and attitudes, academic performance and academic behaviour with only a few studies indicating negative relationship (Mura et al., 2015). Physical activity is also important in reducing body fat which is the prime factor for many non-communicable diseases. In this regard, more research is
required to investigate the effect of school-based physical activity to support the effort of initiating policies to promote changes at decision-making levels aimed at providing children with more regular access to physical activity in school settings (Uzunoz, Chin, Mok, Edginton, & Podnar, 2017). In addition, emphasis must be placed on finding new ways to promote physical activity and encourage behaviour change to perpetuate physical activity participation among children by making it interactive, fun, as well as engaging.

**Methods**

This study is a preliminary review for implementing physical activity intervention in Malaysian schools. The research designs of these studies are quasi-experimental based. The keywords used in this review were physical activity, school, intervention and Malaysia. The databases used during the literature search were ScienceDirect, PubMed and google search. The dates of the journal ranged from the years 2012 until 2017. Studies that were selected are interventional/longitudinal and are conducted in primary or secondary schools in Malaysia. Based on the literature search, a total of five school-based physical activity interventions were found. Most studies conducted in Malaysia are cross-sectional with over a hundred search results. In addition, substantial school-based physical activity interventions have been conducted in other countries primarily in the Western regions. However, interventional or longitudinal studies in Malaysia were limited and many studies did not meet the criterion for this review.

Table 1 summarises the frequency, intensity, type and time (FITT) of each intervention as well as the outcome in each of the reviewed studies. In the study conducted by Rengasamy (2012), a total of 86 females aged 16 years old were recruited for a physical fitness program to measure their health-related fitness specifically flexibility, cardiovascular endurance and muscular strength. The intervention used were circuit training as suggested by Morgan and Adamson (1972) with four different exercises, however, the type of exercise and intensity is not stated in the study. The intervention lasted for 10 weeks and conducted twice a week with each session lasting 40 minutes. After 10 weeks, post-test data were collected. From the analysis, ANCOVA indicated that there was a main effect in cardiovascular endurance F (1, 83) = 44.69, p > 0.05 and for flexibility F (1, 83) = 46.80, p < 0.05. As for muscular strength, the result was not significant F (1, 83) = 3.54, p > 0.05. The results of the intervention showed significant improvements in enhancing cardiovascular endurance and flexibility among the intervention group. Improvements in flexibility and cardiovascular endurance can be acquitted to increase training volume. However, muscular strength showed no significance difference, which may be attributed to the insufficient intensity and the non-compliance of the progressive overload principle (Rengasamy, 2012).

Rengasamy et al. (2014) conducted another similar study two years later to evaluate the effect of employing physical fitness intervention on cardiovascular endurance among Malaysian male and female secondary school students aged 16 years old. The four exercises included were the shuttle run, burpee, jumping jacks and modified sit-ups. Each exercise was conducted for 30 seconds with a rest interval of 30 seconds. The rest interval was reduced to 25 seconds to factor in the overload principle after the fifth week as suggested by Morgan and Adamson (1972). The control group participated in regular physical education classes. Post-test data were collected after 10 weeks. Analysis using ANCOVA indicated that there was a main effect in cardiovascular endurance F (1, 84) = 18.17, p < .05; Cohen d = 0.17 between the boys and also a main effect F (1, 83) = 44.69, p < .05; Cohen d = 0.35 between the girls. The results showed that treatment in the experimental group was effective in enhancing the cardiovascular endurance among the experimental groups of boys and girls (Rengasamy et al., 2014).
Physical education is conducted twice a week in most schools in the country with a duration of 40 minutes a session as directed by the Ministry of Education. This may have fulfilled the minimum duration and the frequency levels required, but lack the sufficient intensity level to accomplish the total training volume to enhance cardiovascular endurance as shown by the control group of males and females (Rengasamy et al., 2014). The duration is still lacking in accordance to the physical activity guideline set by the United States Department of Health and Human Services (1996), which is at least 30 minutes of moderate physical activity on most days of the week. Intervention programs within physical education classes are effective in improving cardiovascular endurance and flexibility due primarily to the increased duration of physical activity. It is strongly suggested that physical educators and curriculum planners introduce intervention programs within regular physical education as it is seen necessary to increase the intensity level which is sufficient to improve selected cardiovascular endurance among the Malaysian school students (Rengasamy et al., 2014). Furthermore, engagement in circuit trainings are considered safe as no injuries was observed during the intervention.

**Results and Discussion**

<table>
<thead>
<tr>
<th>Authors (year)</th>
<th>Intervention (Type)</th>
<th>Sample size (participants)</th>
<th>Length of study</th>
<th>Frequency per week (duration)</th>
<th>Intensity</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rengasamy (2012)</td>
<td>Circuit training (4 types of exercises)</td>
<td>N=86 (16-year-old female)</td>
<td>10 weeks</td>
<td>Twice a week (40 mins)</td>
<td>Not stated</td>
<td>CE¹: F (1, 83) = 44.69</td>
</tr>
<tr>
<td>Rengasamy, Raju, Lee, and Roa (2014)</td>
<td>Circuit training (4 types of exercises)</td>
<td>N=173 (16-year-old male &amp; female)</td>
<td>10 weeks</td>
<td>Twice a week (40 mins)</td>
<td>30 secs per exercise (4 mins)</td>
<td>Boys: F (1, 84) = 18.17</td>
</tr>
<tr>
<td>Salimin, Elumalai, Shahril, and Subramaniam (2015)</td>
<td>Healthy Lifestyle Program Manual National Service (18 low, 40 moderate &amp; 14 high intensity)</td>
<td>N=40 (8-year-old male &amp; female)</td>
<td>8 weeks</td>
<td>5 times/week (60 mins)</td>
<td>Low-high</td>
<td>Before: N⁴ (SD⁵) weight = 24.91 (0.9)</td>
</tr>
<tr>
<td>Elumalai, Munusamy, Salimin, and Shahril (2016)</td>
<td>Circuit training (6 types of exercises)</td>
<td>N=40 (16-year-old female)</td>
<td>8 weeks</td>
<td>Thrice a week (36 mins)</td>
<td>60-90% of max HR</td>
<td>Before: N⁴ (SD⁵) BMI = 26.24 (2.29)</td>
</tr>
</tbody>
</table>

Notes:
- CE¹: Critical Effect
- F²: Favorable Effect
- MS³: Mixed Sign Effect
- SD⁵: Standard Deviation

Results presented in the table show statistical significance in improving cardiovascular endurance, flexibility, muscular strength, and mean and standard deviation outcomes.
The following study was conducted by Salimin et al. (2015) to evaluate the effectiveness of eight weeks physical activity program among obese students of SJK (T) Barathi, Hutan Melintang. A total of 40 students (male, n = 20; female, n = 20) were recruited in this study. The intervention used was based on the study conducted by Salimin et al. (2016) which was developed for obese Malaysian adolescents which indirectly promotes the healthy lifestyle. The program was based on the Healthy Lifestyle Program Manual National Service. The intervention program consisted of 18 low intensity activities, 40 moderate intensity activities, 14 high intensity activities, and 8 relaxation therapy sessions spread out in the duration of 8 weeks. The goal of this intervention is to address the issue of healthy lifestyles among Malaysian.

The level of obesity is showed in Table 2 which was based on the Asia World Health Organisation 2004 norms (Salimin et al., 2015). The findings showed that there were significant reduction in weight as the overall mean of the program, mean (SD) = 24.91 (0.9) which has been reduced to mean (SD) = 23.60 (0.9) after the intervention. Before the intervention, 38 participants (95%) of the participants were pre obese and two participants (5%) were obese. After the intervention, seven participants (17.5%) were normal and 33 participants (82.5%) were pre obese. The findings of this study were consistent with the study conducted by Gunathevan, Norkhalid, Yusop, Amin, and Nuzep (2013), which showed a positive reduction in weight by facilitating the activities provided by the Manual Healthy Lifestyle National Service within an eight week timeline. Furthermore, there was no difference in the mean obesity scores between the males and females. Consistent with the study conducted by Siew in 2010, in which the intervention program is influenced by demographic, psychosocial and working times as lead factors causing obesity among males and females (Salimin et al., 2015).

<table>
<thead>
<tr>
<th>Kg/m²</th>
<th>Level</th>
<th>No. of Participants (%)</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 18.5</td>
<td>Underweight</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>18.5 – 22.9</td>
<td>Normal</td>
<td>-</td>
<td>-</td>
<td>7 (17.5)</td>
</tr>
<tr>
<td>≥ 23.0</td>
<td>Overweight</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>23.0 – 27.4</td>
<td>Pre-obese</td>
<td>38 (95.0)</td>
<td>33 (82.5)</td>
<td></td>
</tr>
<tr>
<td>27.5 – 34.9</td>
<td>Obese Class I</td>
<td>2 (5.0)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>35.0 – 39.9</td>
<td>Obese Class II</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>≥ 40.0</td>
<td>Obese Class III</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>40 (100)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 2: Level of obesity (BMI) for pre- and post-tests*
In another unrelated study, physical education in the form of circuit training was also used to evaluate its effectiveness on the level of body mass index (BMI) of 40 purposely sample form four overweight and obese female students from SMK Taman Bukit Maluri, Kuala Lumpur (Elumalai et al., 2016). The circuit training intervention for this study was specially planned based on the frequency, intensity, type and time (FITT) principle by giving emphasis on the intensity and frequency with a minimum of 20-30 minutes per session, three times a week and at the intensities of 60 to 90% from the maximum heart rate (Elumalai et al., 2016). The circuit consisted of six exercises in which students completed each exercise in one minute and had a rest interval of one minute. The participants had to complete four sets of exercises. The ratio for this exercise to rest interval is one-to-one (1:1).

In addition, based on the progressive overload principle, intensity and heart rate were gradually increased on the fourth week by increasing the duration for each set to one minute and thirty seconds and the shortening of the rest interval to thirty seconds. This will increase the difficulty of the sets, which in turn would lead to changes to the participant's physiology and therefore help their body to adapt. Due to the increased level of energy, an increase in intensity is needed to overcome the energy balance in order to further lose weight and avoid stagnation or the ceiling effect. The Figure 1.0 below demonstrates the summary of relationships between circuit training, FITT principles and its outcome of the three studies conducted on circuit training.

Figure 1. Summary of FITT for circuit training and the outcome

The results indicate a significant difference in the mean score between pre-test (mean = 26.24, SD = 2.29) and post-test (mean = 24.88, SD = 2.28) for the intervention group. The result proved that the intervention program was successful in giving significant effects towards the body fat percentage and manage to reduce BMI of the treatment effectively (Elumalai et al., 2016). In addition, there was also significant difference between the intervention group (mean = 24.88, SD = 2.28) and control group (mean = 26.15, SD = 1.14). The outcome shows that the specially designed circuit training program could be used as a physical activity to reduce BMI compared to normal physical activities during school physical education classes (Elumalai et al., 2016).
Based on the results of this study, the circuit training intervention showed a positive effect on the level of body fat among obese female students in the intervention group. The results of this study were consistent with the study conducted by Yongchie et al. (2015) who conducted research by using the physical intervention programme for six weeks to increase the cardiovascular fitness among 16 years old obese teens in which the findings had reported that this method was effective in reducing fat around the waist and the insulin levels among the research participants. Findings from these studies also indicated that a combination of three or more types of training was sufficient in inducing a positive effect towards reduction in body weight (Elumalai et al., 2016).

The final study entitled: The school-based intervention to prevent overweight and disordered eating in secondary school Malaysian adolescents, was conducted by Sharif Ishak et al. (2016), at two schools in Hulu Langat, Selangor. Adolescents aged between 13-14 years old were recruited. A peer-education strategy was adopted to convey knowledge and teach skills relevant in achieving a healthy lifestyle in which the intervention mainly promoted: healthy eating, positive body image and active lifestyle (Sharif Ishak et al., 2016). The intervention is known as ‘eat right, be positive about your body and live actively’ (EPaL). The parameters assessed were body weight, disordered eating status, stages of change (for healthy diet, breakfast, food portion size, screen viewing and physical activity), body image, health-related quality of life, self-esteem, eating, physical activity behaviours as well as knowledge, attitude and practice towards a healthy lifestyle. The assessments were conducted at three-time points: baseline, post-intervention and 3-month follow-up.

EPaL provides students with cognitive and behavioural skills to effect the changes in targeted behaviours by aiming to alter disordered the eating behaviour, promote physical activity, prevent sedentary lifestyle, encouraging eating in all meal time, consumption of fruits and vegetables and lowering sweetened beverages intake (Sharif Ishak et al., 2016). The intervention also integrated the transtheoretical framework by categorising the adolescents into stages of change in which the cognitive and behavioural adaptions were made in order for them to adhere to the intervention. In addition, physical activity assessment was based on activity recall in which adolescents were asked to recall activities such as sitting, walking and standing every fifteen minutes during a 24-hour period. Each activity was assigned with a calculated metabolic equivalent (MET) in which the total energy expenditure was derived by including the duration of activity and body weight of the adolescents. The physical activity level (PAL) of the adolescents were then calculated by dividing the total energy expenditure by the basal metabolic rate (BMR) and was classified in to four categories: Sedentary (PAL < 1.40), light (PAL = 1.40–1.69), moderate (PAL = 1.70–1.99) and vigorous (PAL = 2.00–2.40) (Food and Agriculture Organization, 2005).

A total of twelve focus groups (n = 72) with adolescents aged 13-14 years old were recruited and engaged in the discussions designed to assess the perceptions towards healthy eating habits, body size/shape and physical activity. There was no direct physical activity intervention implemented, rather the study focused on a more psychological intervention to promote physical activity. The intervention lasted for sixteen weeks in which sessions lasted for sixty to ninety minutes and conducted once a week. However, the study was still retrospectively registered and therefore no results were collected. Discussions of previous studies indicated on EPaL’s contribution in preventing overweight and disordered eating by giving positive effects on body weight status, healthy lifestyle behaviour as well as health-related quality of life peer educators and participants (Sharif Ishak et al., 2016). Thus, this may also serve as a model for future implementations in the Malaysian school settings, specifically on adolescents.
The quality of life in terms of health is expected to significantly improve in peer educators and participants after the implementation of the program (Sharif Ishak et al., 2016) as generally peer educators testified that peer-led approach gave them a valuable opportunity for personal development and learning by building the young people’s skills and abilities (Story, Lytle, Birnbaum, & Perry, 2002) as well as promoting healthy lifestyle practices (Birnbaum, Lytle, Story, Perry, & Murray, 2002). In addition, the integrated program for both tackling obesity and eating disorder issues via physical activity and food intake components decreased the duration and made the program more cost-effective compared to separate programs (Neumark-Sztainer, 2005). However, limitations for this study include randomisation was only performed when selecting the schools, and recruiting participants and assigning peer educators would be more favourable and may produce higher level of confidence in term of the validity and causality of the programme’s effectiveness (Cottrell & McKenzie, 2011).

Conclusion

Future studies assessing factors that influence school implementation of physical activity policies would benefit from using a comprehensive framework to help identify domains for facilitating or inhibiting implementation of physical activity (Glowacki, Duncan, Gainforth, & Faulkner, 2017). A transtheoretical framework may help in identifying the levels of the students’ motivation of students in wanting to participate physical activity. The main constructs of the transtheoretical model are the stages of change, processes of change, decisional balance, and self-efficacy. In the 10-week of intervention however, limited studies have been found for the use of the transtheoretical framework on younger participants such as primary school children. Therefore, future study is needed to evaluate the use of the transtheoretical framework in school settings. Furthermore, The Global Community Health (GCH) foundation had recently introduced the Brain Breaks® Physical Activity Solutions or simply brain-breaks, an exercise video which can assists students’ development in learning and health. The aim of the GCH foundation is to expand successful implementation of globally recognised, evidence-based health and wellness programs in their communities while respecting local culture and customs (GCH foundation, 2017). The implementation has already been conducted in schools in Turkey and has shown positive improvements in attitudes towards belief, self-efficacy, self-confidence and motivation towards physical activity (Uzunoz et al., 2017). However, future study is required to evaluate the effects of this intervention in Malaysian school children.

References


The Effect of Physical Activity on Sustained Attention: A Short Review
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Abstract
Physical activity is known for its benefits to improve cognitive functions such as sustained attention. A preliminary review for physical activity effects on sustained attention articles using databases PubMed, ResearchGate, ScienceDirect and Google Scholar was undertaken. The date of these articles publication ranged from 2010 till 2017. There is total of nine studies of both longitudinal and cross-sectional studies were selected in this review. Most of the studies showed a positive relationship between physical activity and sustained attention. Future studies may consider a longitudinal study design to study the effect of physical activity on sustained attention in prolonged time, and the corresponding effect of gender, age, motivation and perceived arousal to investigate the relationship together with other possible factors that can affect sustained attention indirectly.

Keywords: Physical activity, sustained attention, preliminary review

INTRODUCTION
Physical activity is any bodily movement produced by the skeletal muscles resulting in energy consumption (Caspersen, Powell & Christenson, 1985) or any bodily movement produced by the muscular system that increases energy expenditure above normal physiological demands (Ortega, Ruiz, Castillo & Sjöström, 2008). Meanwhile, exercise is slightly different from physical activity as it is a subcategory of physical activity. It is defined as physical activity that is planned, structured, and aims to improve or maintain one or more components of physical fitness (Caspersen et al., 1985). Much research, including systematic review and meta-analysis confirms that physical activity enhance quality of life (Gillison, Skevington, Sato, Standage & Evangelidou, 2009; Berger & Tobar, 2012).

Following the guidelines by American College of Sports Medicine (ACSM) and American Heart Association (AHA, 2007), adults aged between 18 – 65 years old are recommended to participate in moderate intensity endurance physical activity, for a minimum 30 minutes, with five days per week; or participating in vigorous intensity endurance physical activity for a minimum 20 minutes, with three days per week to maintain a healthy lifestyles. The recommendation for older adults (above 65 years old) is similar to adults, however, there are several differences that should be taken into account such as recommended intensity of aerobic activity must consider their aerobic fitness, flexibility activities, and for those at risk of fall are recommended to practice balance activities. Moreover, they should have an action plan to achieve recommended physical activity that
integrates preventive and therapeutic recommendations. Physical activity is known for its benefits such as enhance learning and memory (Hillman, Erickson, & Kramer, 2008) increase physical fitness among children (Strong et al., 2005), promotes the development of the cardiovascular and musculoskeletal system, and academic achievement (Best, Miller & Naglieri, 2011). Children and adolescents aged between 5-17 years old are recommended to accumulate at least 60 minutes of moderate-to-vigorous physical activity daily (WHO, 2010; Jansses & Leblance, 2011).

**Background of sustained attention**

Sustained attention is a process that enables sustained performance on tasks over an extended period of time (Cohen, 2011). It is one of the primary elements of attention process that enables a person to maintain vigilance, continuous effort, persistence response, selective, and focused attention. This is important for gathering information and instruction and plays a big role throughout children development. Besides, this ability is required in prolonged high demand environments such as surgery, military and lifeguarding, and needed in many daily activities such as attending to academic lessons at school. Those that have difficulty in sustaining their attention may appear to be day dreamy, bored, fidgety, and disorganised. In the worse case, it may result in attention-deficit hyperactivity disorder (ADHD).

**Justification for review**

Physical activity is already known for its benefits to improve and maintain health physically and mentally. For example, adults who wish to improve their fitness or further reduce their risk for premature chronic health conditions and mortality related to physical inactivity should adherence to the minimum recommended amounts of physical activity (Kesaniemi, Danforth, Jensen, Kopelman, Lefebvre, & Reeder, 2001). Besides, it is easy to be practised in many settings, and places, such as in schools, parks, and hospitals. Recently, there are many reviews conducted to examine the relationship between physical activity and cognitive functions such as working memory, concentration, and attention. However, fewer reviews have been conducted to examine the relationship between physical activity and sustained attention. This is may be due to lack of updated knowledge on recent research that has been done on this topic. Based on a previous study by Luque-Casado and colleagues (2013) stated that those who have higher physical fitness were related to better overall sustained attention, demonstrating a better ability to allocate attentional resources over time. In fact, prolonged high demand activities such as military, surgery and border surveillance require sustained attention as well. Moreover, this cognitive function represents a fundamental component of the general cognitive capacities of the human because a reduced ability to monitor significant sources of information directly affects all cognitive abilities such as slow or failures to respond to target stimuli (Sarter, Givens & Bruno, 2001). Therefore this review aims to update the knowledge of recent research on this topic for future study.

**Methods**

This is a review to examine the effect on sustained attention. The research design of the study is quasi-experimental based. The keywords used in this review were physical activity, exercise, sustained attention and vigilance. The databases used in literature research are Pubmed, ScienceDirect and Google Scholar. These journals date are ranged from 2010 till 2017. Experimental and cross-sectional studies were selected for this review. There are nine interventions on physical activity and sustained attention in the literature search.
## Results

<table>
<thead>
<tr>
<th>Authors (year)</th>
<th>Study design</th>
<th>Physical activity intervention</th>
<th>Control variables</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medina, Botter &amp; Miranda (2010)</td>
<td>Longitudinal</td>
<td>Treadmill running (moderate-to-vigorous intensity)</td>
<td>Anthropometric, ergospirometry, blood pressure, and cognitive measures</td>
<td>There is no significant difference on CPT-2 between user and non-user of methylphenidate after physical activity (p&gt;0.05) except for the style of response (p&lt;0.05). There is a significant difference on CPT-2 between after physical activity and during stretching session (control) by ADHD subjects in confidence index and vigilance measure of post-exercise (p&lt;0.05).</td>
</tr>
<tr>
<td>Palmer, Miller &amp; Robinson (2013)</td>
<td>Cross-sectional</td>
<td>30 minutes movement program (accelerometer)</td>
<td>Sociodemographic information (Household income)</td>
<td>There is a significant difference on sustained attention between acute exercise and sedentary condition (p&lt;0.05).</td>
</tr>
<tr>
<td>Ballester, Huertos, Yuste, Llorens &amp; Sanabria (2015)</td>
<td>Longitudinal</td>
<td>Leger Multi-stage fitness test</td>
<td>Not utilised</td>
<td>The correlation analysis showed that there was no significant relationship between PVT main dependent variables (overall mean reaction time and lapses), with the main index of cardiovascular fitness (time to exhaustion) (p&gt;0.05).</td>
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</tbody>
</table>
### Geertsen, Thomas, Larsen, Dahn, Andersen, Krause-Jensen, Korup, Nielsen, Wienecker, Ritz, Krustrup, Lundbye-Jensen (2016)

<table>
<thead>
<tr>
<th>Study Details</th>
<th>Design</th>
<th>Task(s)</th>
<th>Outcome Measures</th>
<th>Findings</th>
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<tbody>
<tr>
<td>Longitudinal</td>
<td>One hour aerobic dance</td>
<td>Anthropometric measures</td>
<td>No significant interaction between groups for sustained attention (p&gt;0.05).</td>
<td></td>
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<tr>
<td><strong>Participants characteristics (sample size &amp; age)</strong></td>
<td><strong>Sustained attention assessment</strong></td>
<td></td>
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<tr>
<td>81 females (16 years old)</td>
<td>Digit Vigilance Test</td>
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</table>

### Luque-Casado, Perakakis, Hillman, Kao, Llorens, Guerra & Sanabria (2015)

<table>
<thead>
<tr>
<th>Study Details</th>
<th>Design</th>
<th>Task(s)</th>
<th>Outcome Measures</th>
<th>Findings</th>
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</thead>
<tbody>
<tr>
<td>Cross-sectional</td>
<td>Incremental effort test</td>
<td>Not utilised</td>
<td>A positive relation between aerobic fitness and sustained attention capacity by comparing reaction time performance, CNV and the P3 amplitude between both groups (p&lt;0.05).</td>
<td></td>
</tr>
<tr>
<td>42 of males and females (21-24 years old)</td>
<td>Psychomotor Vigilance Test (PVT)</td>
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### Wilson, Olds, Lushington Petkov & Dollman (2015)

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<tr>
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<th>Task(s)</th>
<th>Outcome Measures</th>
<th>Findings</th>
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</thead>
<tbody>
<tr>
<td>Longitudinal</td>
<td>Active Lesson Breaks (ALBs) and Passive Lesson Breaks (PLBs) measured with accelerometer</td>
<td>Temperature and airflows in classroom, work output &amp; reaction time measure</td>
<td>There is no significant difference between mean reaction time and percentage of lapses between ALBs and PLBs (p&gt;0.05).</td>
<td></td>
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<tr>
<td>58 males (11-12 years old)</td>
<td>Psychomotor Vigilance Test (PVT)</td>
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### Leong, Maghada m & Hashim (2015)

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</table>
Based on the first study conducted by Medina et al. (2010), there were a total of 25 males diagnosed with attention deficit hyperactivity disorder (ADHD) consistent with Disease Statistical Mental –IV (DSM-IV), aged from 7 to 15 years old were recruited. They were divided into two research conditions; user group who receive methylphenidate (MTP) dose everyday (n= 16) and non-user group whom the drug was not administered (n=9). The aim of the study was to test the hypothesis that central catecholamines (CA) responsible for the increase in speed reaction seen after physical activity and to measure the impact of high intensity physical activity on their sustained attention. The study design implemented was a longitudinal design. There were three sessions; during diagnosis, stretching session (control) and after physical activity. The physical activity intervention was done by treadmill running, moderate to vigorous intensity to achieve target heart rate. Interestingly, both groups were participating in physical activity session as well as stretching session, the difference was just either receiving MTP dose everyday or not. Meanwhile, the sustained attention assessment used was Corner’s Continuous Performance Test-II (CPT-II) and, anthropometric, ergospirometry, blood pressure, and cognitive measures were controlled. The outcome of the study found that there was no significant difference on CPT-II between user and non-user after physical activity session (p>0.05) except for style of the response (p=0.05).
However, there was a significant difference on CPT-II between after physical activity and stretching session among all of twenty-five ADHD subjects, ignoring MTP use (p<0.05). The aim of study seems to have been answered. Physical activity can improve the sustained attention of ADHD children, and given the similarity between the cognitive responses seen after physical activity in ADHD and asymptomatic children, the catecholaminergic theory explaining improvements in reaction time after exercise appears not to be reasonable (Medina et al., 2010). However, the study has some restrictions; effect of physical activity has not been examined on the other aspects of attentional dysfunction of children with ADHD; no analysis of ADHD subgroups was made due to small sample sizes and this research has no control of effects by a healthy control group.

Second study was conducted by Palmer and colleagues in 2013 examined the influence of acute exercise on preschoolers’ cognitive function (sustained attention). The study design implemented was a cross-sectional. A total of 16 preschoolers (13 males and 3 females), aged 4 to 5 years old were recruited. The physical activity intervention was 30-minutes planned movement program as suggested by Robinson, Webster, Logan, Lucas and Barber (2012) and, Goodway and Robinson (2006). The physical activity intensity was quantified using accelerometer. The sustained attention assessment used was Picture Deletion Task for Preschoolers (PDTP). Each child completed PDTP, after engaging in the exercise and sedentary conditions. The controlled variable was household income. The result showed that there was a significant difference on sustained attention between acute physical exercise and sedentary condition (p<0.05). However, this study also pointed out some limitations such as current study’s index of response inhibition was not sufficiently sensitive to detect changes. Unlike other response inhibition tasks, such as the flanker task, the go/no-go task, and the Stroop task, the PDTP does not require participants to override a prepotent response to avoid making an error. Having to override a prepotent response may challenge the response inhibition system to a greater extent than the PDTP does (Palmer et al., 2013). Besides, the activity composing the sedentary condition may have acutely enhanced the preschoolers’ inhibitory function. Therefore, future studies may employ multiple sedentary groups engaged in different types of activities such as reading and creative playing (Palmer et al., 2013).

The third study was conducted by Ballester and colleagues (2015) investigated the relationship between regular sport participation (soccer) and vigilance performance, the potential influence on gender, cardiovascular fitness, motivation toward task and subjective arousal. There are 39 soccer players from Spanish League junior team (24 males,15 females) were recruited into athletes group, meanwhile 36 students from local public schools (18 males,18 females) were selected to be part of the non-athletes group. Therefore, a total of 75 participants aged of 12 to 15 years old were recruited. This study employed a longitudinal research design. The assessment of physical activity used in this study (Leger & Lambert, 1982) was Leger Multi-stage fitness test, to measure maximal aerobic power of school children and healthy adults. The assessment required the participants to run back and forth on a 20-meters course at initial speed of 8.5km/h, which then increased progressively 0.5 km/h every minute in accordance with a pace dictated by a pre-recorded tape. It finished when the participants acknowledged voluntary exhaustion. The assessment used for sustained attention was Psychomotor Vigilance Test (PVT). This test required the participants to respond, as rapidly as possible, to a visual stimulus that appears on the screen. It measured vigilance given monotonous, repetitive, and unpredictable nature of target onset. The results showed that there was a significant difference in level of cardiovascular fitness among groups (p<0.05). Concerning the performance in PVT, there was no significant difference between males and females (p>0.05). Moreover, there was a significant difference in number of lapses in PVT performance between groups (p<0.05) with non-athletes showed significant increase compared to athletes group. Interestingly, the
between group difference in vigilance capacities did not seem to be influenced by motivation toward task and/or perceived activation toward task even though the two groups of participants significantly differed in these two measures (Ballester et al., 2015). The correlation analysis further showed that there was no significant relationship between PVT main dependent variables (overall mean reaction time and lapses), with main index of cardiovascular fitness (time to exhaustion) ($p>0.05$). The limitation of this study to be considered was that the lack of significant relationship between vigilance performance and cardiovascular fitness may be due to low executive demands of PVT used compared to other test such as flanker task.

Next, a study was conducted by Leong and colleagues (2015), implementing a longitudinal study design, to examine the combined effects of milk supplementation and anaerobic exercise on short-term memory and sustained attention. There were a total of 81 females students aged 16 years old recruited in this study. They were randomly assigned into two groups: intervention group (combination of milk and exercise) and control group. The physical activity intervention was one-hour aerobic dance held twice per week for 6 weeks. The assessment for sustained attention was Digit Vigilance Test (Lewis, 1995). The result showed that there was no significant difference among groups in Digit Vigilance Test ($p>0.05$). Methodological differences, especially the measure of sustained attention used, were speculated to have contributed to contradictory finding (Leong et al., 2015). There were some limitation to be considered; this study employed quasi-experimental design. Inherent in this research design is the threat to the internal validity. Specifically, a potential confounding factor in this study, nutrient intake other than that provided during the intervention, may interfere with the outcome. Besides, the participants included in this study were female students 16 years of age, thereby restricting the generalizability of the findings beyond this age group and sex (Leong et al., 2015).

Another unrelated study conducted by Luque-Casado et al. (2015), examined the relationship between aerobic fitness and sustained attention capacity by comparing task performance and brain function, by means of event-related potentials (ERP), in high- and low-fit young adults. This study has recruited 42 male participants that aged from 21 to 24 years old. Twenty undergraduate students recruited were grouped into low-fit while another twenty-two participants from triathlon local clubs and Faculty of Physical Activity and Sport Sciences in Spain were grouped into high-fit group. The study design implemented was cross-sectional. Assessment used to measure aerobic fitness was an incremental effort test by using ViaSprint 150P cycle ergometer to obtain power values, and JAEGER Master Screen gas analyzer to measure gas exchange during effort test. For assessing sustained attention, Psychomotor Vigilance Test (PVT) (Wilkinson & Houghton, 1982) was used which resulted to behavioural (reaction time), and electrophysiological (ERP) (contingent negative variation (CNV) and P3) outcomes. The results showed that a positive relation between aerobic fitness and sustained attention capacity by comparing reaction time performance, CNV and the P3 amplitude between both groups ($p<0.05$). This study also suggested considering specific sport groups and accounting for the potential influence of the perceptual-cognitive skills involved in sport training context to clarify the specific, rather than combined, effect both of the cardiovascular fitness and the sport training context on vigilance performance.

Next, Geertsen et al. (2016) conducted a study investigated the association between motor skills, exercise capacity and cognitive functions. There were a total of 423 participants aged from 8 to 10 years old, comprises of 209 female and 214 males from seven Danish Municap schools. The study design implemented was cross-sectional. The physical activity intervention used were visuomotor accuracy-tracking task (Roig, Skriver,
Lundbye-Jensen, Kiens, & Nielsen, 2012; Thomas, Beck, Lind, Johnson, Geertsen, Crisitanssen & Lundbye-Jensen, 2016) and whole-body coordination task (Essendrop & Hansen, 1997) to measure fine and gross motor skills while Yo-Yo intermittent recovery level 1 children’s test (YYIR1C) (Ahler, Bendikson, Krustrup & Wedderkopp, 2012) to measure exercise capacity. The sustained attention assessment used was Rapid Visual Processing (RVP) from Cambridge Neuropsychological Test Automated Battery (Luciana & Nelson, 2002). The results showed that performance in both the fine and gross motor skill task was significantly associated with better performance in sustained attention (p < 0.001). Meanwhile higher exercise capacity (YYIR1C) was associated with fewer errors in sustained attention (-0.11± 0.04, p = 0.046).

Then, a study was conducted by Ciria and colleagues (2017), which investigated the role of aerobic fitness as a key factor in sustained attention capacities in young adults. The study design implemented was cross-sectional. There were 44 young adults recruited in this study (22 males and 22 females) aged from 18 to 23 years old and they were assigned into two groups; high fit group and low-fit group. The physical activity intervention used was incremental test by using cycle ergometer or known as ventilator anaerobic threshold (VAT) determination test to determine the fitness level of participants. Meanwhile, the sustained attention assessments used were a modified version of PVT (Wilkinson & Houghton, 1982) and Oddball test (Ariga & Lleras, 2011). The controlled variable was anthropometric measures. The result of PVT and Oddball test showed that there was a significant difference between both groups in overall reaction performance but not in the effect of session. For future studies should investigate complex organ interactions (brain-heart communication) as a mechanism contributing to enhance cognitive and brain function in physically fit individuals. (Ciria et al., 2017).

A study by Chou and Huang (2017) investigated whether a yoga exercise intervention influenced the sustained attention and discrimination function in children with ADHD. The study design implemented was longitudinal. There were a total of 49 children aged from 8 to 12 years old recruited and assigned into yoga exercise group and control group. The physical activity intervention was yoga exercise and each participant’s heart rate was recorded. Meanwhile, the sustained attention assessment used was Visual Pursuit Test (VPT) (Schmid, Sauter, Stepeansky, Lobentanz & Zeitlhofer, 2005). The findings showed that yoga exercise showed significant effect on reaction time and response accuracy at VPT (p<0.05) while no impact found for control group (p>0.05). The limitation of study mentioned that although this study controlled the homogeneity of the two groups in terms of gender, age, ADHD type, BMI, physical fitness, medication, and intelligence, the non-randomized controlled trial design and unbalanced gender proportions (i.e., primarily boys) may limit the validity of the findings (Chou & Huang, 2017). Besides, medication use, time spent in video games, internet, and television watching may confound yoga exercise effects on cognitive function of children with ADHD. Third, present study showed little evidence provided to interpret the mechanism of yoga effects on cognitive function of children with ADHD without physical fitness assessment after the 8-week yoga program (Chou & Huang, 2017). Finally, although the possibility is low, the recent study could not completely rule out the possibility that the observed effect was a result of less attention paid to the control group (Chou & Huang, 2017). The suggestion for future studies is to investigate and expand upon the present findings by reporting the level of physical activity outside the exercise intervention and applying cognitive and behavioural perspectives to the assessment of ADHD symptoms (Chou & Huang, 2017).

The Figure 1 below demonstrates the summary of relationship between physical activity intervention and sustained attention.
Conclusion

From the previous studies reviewed above revealed that physical activity benefits the participants in sustaining attention especially aerobic or moderate to high intensity physical activity. Sustaining attention is one of cognitive function that is important for gathering information and instruction and plays a big role throughout human development. Moreover, this ability is highly required in prolonged high demand environments such as surgery, military and lifeguarding. Sustained attention deficit may occur among those who are having Attention Deficit Hyperactive Disorder (ADHD) and it is usually happened among children. Therefore physical activity may be considered as therapeutic recommendation for ADHD problem.

Besides, future studies may consider a longitudinal study design to update the effect of physical activity on sustained attention in pro-longed time. Moreover, the researcher may consider studying the corresponding effect of gender, age, motivation and perceived arousal on this relationship to view other possible factors that can affect it indirectly, or even to try other type of physical activities such as strength training, and flexibility exercise to see whether it affects sustained attention as well as to compare between these physical activities effects on sustained attention.

References


Thai Monozygotic Triplets’ Recovery from Thai Dance Activity Using Imagery Intervention

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Abstract

This study aimed to examine three physiological variables, oxygen saturation (SpO²), heart rate (HR), and body temperature (BT), including perceived fatigue at rest, over 44-min Thai dance, and then measure these variables again, after the performance of warmth imagery in monozygotic triplets. Participants were three Thai female triplets (T) who were born to the same mother, at the same time, and share the same environment, 18 years of age. They were giving their health-check details (T1 = normal; T2 = hyperactivity; T3 = hypotension) and tested their body temperature (BT: Degree Celsius), oxygen saturation (SpO²: percent), heart rate (HR: time/second), and perceived fatigue (FT: 5 point rating scale) at rest, over 44-minute Thai dance, and at imagery intervention sessions, lasting approximately 1 and half hour. Two-way ANOVA repeated measures were used to be comparing main effects between each variable, as well as to examine whether imagery intervention affected on recovery from physiologies and fatigue. Finally, a visual analysis of graph was used to find relation among dependent variables. Results of this study are; 1) SpO²: there was no a significant main effect of sessions, (F(2,30) = 1.04, MSE = 3.02, p > .05), as well as there was also no a significant main effect of health, (F(2,30) = .43, MSE = 1.25, p > .05), and there was no a significant interaction between of sessions and health, (F (4,30) = .13, MSE = .39, p > .05), 2) HR: there was a significant main effect of sessions, (F(2,30) = 1.04, MSE = 2446.39, p < .05), as well as there was also no a significant main effect of health, (F (2,30) = .57, MSE = 88.51, p > .05), and there was no a significant interaction between of sessions and health, (F(4,30) = .30, MSE = 45.96, p > .05), 3) BT: there was no a significant main effect of sessions, (F(2,30) = 1.13, MSE = .29, p > .05), as well as there was also no a significant main effect of health, (F(2,30) = 1.71, MSE = .36, p > .05), and there was no a significant interaction between of sessions and health, (F(4,30) = .05, MSE = .01, p > .05), 4) FT: there was a significant main effect of sessions, (F(2,30) = 7.11, MSE = 11.40, p < .05), as well as there was also no a significant main effect of health, (F(2,30) = .30, MSE = .48, p > .05), and there was no a significant interaction between of sessions and health, (F (4,30) = .16, MSE = .25, p > .05. This study suggested that all triplets generated low oxygen saturation and body temperature as the same way general human are during working out. Nevertheless, one of three triplets who had a hypotension generated low heart rate as an opposite way another two had done, however, their perceived fatigue levels were highly generated during working out. Finally, this study showed that at imagery intervention session, all triplets’ physiologies and fatigue can be retrieved which might be useful for physical activity recovery.

Keywords: monozygotic triplets; body temperature; oxygen saturation; perceived fatigue; Thai dance

INTRODUCTION
Monozygotic triplet pregnancy occurs from three ways that a single egg is splitting, or the egg splits into two and another one of two split again. They are always either three girls or three boys with the same general DNA characteristics, so the three children or offspring born at one birth, at the same time from the same pregnancy (Thongnong, 2017). In physical activity study, it is rare to find them and indicate whether their physiologies occur as the same way of general human and how to recover after exercise. Commonly, physical training with resistance is an underlying cause of generation of tendon and muscle force from muscle tension (Erskine, Jones, Williams, Stewart, & Degens, 2010). Maximal contraction or tension results in a decrease of muscle motor units’ activity (Huber, Kulczyk, Lisinski, & Lipiec, 2013). Factors associated with injury in sport include insufficient duration of warm up, duration of slow running, and competition performance repetition (Guidetti, Cagno, Gallotta, Battaglia, Piazza, & Baldari, 2009). Moreover, a causative factor in hamstring injuries is neural tension as a byproduct of insufficient warm-up, poor flexibility, strength imbalance, muscle weakness, fatigue (Newsham, 2006), and muscle stretch (McHugh, Johnson, & Morrison, 2012). In particular, the fatigue causes impairment of levels of force sense in both healthy individuals and individuals with functional ankle instability (Wright & Arnold, 2012). Theoretically, inactive skeletal muscle causes low metabolic rate and constant blood flow creating the body temperature of between 33 – 35°C (Wendt, van Loon, & van Marken Lichtenbelt, 2007), oxygen saturation of between 95–100%, and normal heart rate at rest (Zaykoski, 2011). In sport, energy use of muscle via metabolism generates high heart rate (Rud & Hallén, 2009), and low body temperature (Wendt et al., 2007; Bhasavanija, 2014), particularly in prolonged exercise and/or 75% intensity exercise (Périard, Thompson, Caillaud, & Quaresima, 2013). Moreover, oxygen saturation is low during exercise and supplied during the recovery period (White, Dawson, Landers, Croft, & Peeling, 2013).

Imagery has been most widely used for practices of sport performance enhancement techniques. It involves the creation of experiences in the mind that can affect behavior, thoughts, and emotions. A number of theories have been developed to explain how imagery works, such as psychoneuro muscular theory, symbolic learning theory, bioinformational theory, and triple code theory (Bhasavanija & Morris, 2014), as well as three memory systems of attention theory (Cox, 2002), and three phases of motor learning theory (William, 2010), to which these can lead automatic processing as a change of behaviour, thought, and emotion (Bhasavanija, 2016; Bhasavanija & Morris, 2013). Moreover, imagery ability consists of six dimensions (vividness, control, ease of generation, speed of generation, duration), as well as five modalities (visual, auditory, kinaesthetic, olfactory, gustatory, tactile), and emotion (Morris, Splittle, & Watt, 2005; Morris & Summers, 2004).

In the context of sport psychology, studies show that imagery of warmth can affect aspect of the cardiovascular system, such as blood flow and oxygen in the blood (Bhasavanija et al., 2013, Bhasavanija, 2014) closely related to skin temperature (Ohkuma, 1983), heart rate (Bhasavanija, Vongjaturapat, Morris, & Muangnapo, 2011), and muscle relaxation (Albright & Fischer, 1990). Moreover, mental imagery makes oxygen saturation, heart rate, and body temperature return to rest (Plessinger, 2014). Thus, imagery of body warmth might help to reduce the risk of soft tissue injury among footballers during matches. The purpose of this study was to examine three physiological variables, oxygen saturation (SpO²), heart rate (HR), and body temperature (BT), including perceived fatigue at rest, over 44-min Thai dance, and then measure these variables again, after the performance of warmth imagery in monozygotic triplets.
Method

Participants
Participants were three Thai female triplets (T) who were born to the same mother, at the same time, and share the same environment, 18 years of age. They were giving their health-check details (T1 = normal; T2 = hyperactivity; T3 = hypotension) and tested their body temperature (BT: Degree Celsius), oxygen saturation (SpO²: percent), heart rate (HR: time/second), and perceived fatigue (PF: 5 point rating scale) at rest, over 44-minute Thai dance period, and at imagery intervention, lasting approximately 1 and half hour.

Equipment

Thai dance. Traditional Thai dance with song “Lao Kra Tob Mai” as a slow-to-fast tempo, lasting 5.28 min per round. Participants were assigned to dance in Thai tradition model for about 8 rounds of song or taking 48-min time in total. Body temperature, heart rate, oxygen saturation, and perceived fatigue were used for measuring participants’ physiologies and feeling over 44-min dancing.

Temperature Measures of Body Warmth (BT). A digital-ear thermometer (Citizen, Model: CTD 505, Antibacterial model, Japan) ranging from 34.0˚C to 43.0˚C, error ranging from 35.5˚C to 42.0˚C (±2 ˚C) was used to measure participants’ skin-temperature (BT) at rest, over 44-minute Thai dance period, and at imagery intervention, lasting approximately 1 and half hour. To begin with, body temperature was measured at the right ear of each participant at rest, over 44-minute Thai dance period, and at imagery intervention, lasting approximately 1 and half hour.

Oxygen Saturation (SpO²) and Heart Rate (HR) Tests. The fingertip pulse oximeter (Beurer, Model: PO 30, Germany), error range of oxygen saturation (SpO²) from 70% to 100% (±2%) and of heart rate (HR) from 30 – 250bpm, (±2 time per sec.) was used for measuring participants’ oxygen saturation (0 – 100%) and pulse rate (0 – 254 time per sec).

Measurement of Perception of Fatigue (FT). A 5-point rating scale was used for measuring participants’ perception of fatigue (FT) at rest, over 44-minute Thai dance period, and at imagery intervention, lasting approximately 1 and half hour. Participants were asked immediately at rest, over 44-min Thai dance period, and at imagery intervention, lasting approximately 1 and half hour, “how would you rate your muscle fatigue, which occurred now by comparing with you had with your muscle fatigue before the session?” To indicate their rating, participants oral answer to the question by rating a point (0 = no fatigue, 1 = some, 2= moderate, 3 = much, or 4 = most fatigue).

Imagery Intervention. The imagery intervention (Bhasavanija & Morris, 2014) combined use of the cognitive-specific function and internal perspective imagery, with focus on the tactile sense during imagery. The content of the imagery script focused on the experience of increasing hand and body warmth. The imagery intervention was recorded as an MP4 file and saving on participants’ smartphones, and lasted 10 minutes. The MP4 file included introductory information, motivational content, relaxation, breathing, concentration, and imagery of body warmth. It was used for all participants. By way of this study, participants were assigned to use an imagery of warmth for mentally treating to recover from physiologies and fatigue.
Procedures

The researchers gained ethics approval from the Ramkhamhaeng University Research Committee. This study was arranged as following preparations: 1) a first aid for three reasons were preserve life, prevent further harm, and promote recovery over experimental period by two nurses, 2) introductory information and consent form for participants’ understanding and agreement to involve in this study, 3) imagery of warmth for mentally treating to recover from physiologies and fatigue, 4) traditional Thai dance and song “Lao Kra Tob Mai” as a slow-to-fast tempo, lasting 5.28 min per round, for about 8 rounds or 48 min in total. Following standard consent procedures, participants were given the introductory information about the aim of this study, the content and purpose of the imagery intervention, the measurement of BT, SpO², and HR, and FT, before consent forms were completed.

I measured SpO², HR at the index finger in the dominant hand and BT at the right ear of all participants at 10-min rest. Then, participants reported their FT. To indicate their rating, participants oral answer to the question (“how would you rate your muscle fatigue, which occurred now by comparing with you had with your muscle fatigue before the session?”) by rating a point (0 = no fatigue, 1 = some, 2= moderate, 3 = much, or 4 = most fatigue). This process took about 15 minutes. Participants were then assigned to perform traditional Thai dance, and re-tested their BT, SpO², and HR, and FT, lasted for 44 minutes. Finally, participants were assigned to perform imagery of body warmth. To begin with, participants were given the introductory information for producing body-warmth by using an imagery training program (“what the rules of imagery practice were, and what do you think of warmth”) to recommend participants using their own symbol for producing the body warmth during performing the imagery program. After that, participants were assigned to listen to a 10min-voice-recorded MP4 presenting instructions for imagery, and performed what was on the MP4 as it was playing. Their BT, SpO², and HR were re-tested during imagery-training. Immediately after finishing the tests, participants were asked to rate their FT by rating a point of five (0 = no fatigue, 1 = some, 2= moderate, 3 = much, or 4 = most fatigue). This process took about 15 minutes. All experimental sessions lasted approximately 1 and half hour. At the end of the study, all participants were thanked for their participation.

Data Analysis

Three participants’ BT, SpO², HR, and FT of three sessions (rest, Thai dance, and imagery) were compared with their health states (T1 = normal; T2 = hyperactivity; T3 = hypotension) using the Two-way ANOVA repeated measure to be comparing main effects between each variable, as well as to examine whether imagery intervention affected on recovery from physiologies and fatigue. Finally, a visual analysis of graph was used to find relation among dependent variables.
Results

Table 1 Tests of Effects between Sessions, Health, and Sessions * Health on Oxygen Saturation

Dependent Variable: Oxygen Saturation

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>124375.041</td>
<td>1</td>
<td>124375.041</td>
<td>43113.197</td>
<td>.000</td>
<td>.999</td>
</tr>
<tr>
<td>Session</td>
<td>6.042</td>
<td>2</td>
<td>3.021</td>
<td>1.047</td>
<td>.363</td>
<td>.065</td>
</tr>
<tr>
<td>Health</td>
<td>2.501</td>
<td>2</td>
<td>1.250</td>
<td>.433</td>
<td>.652</td>
<td>.028</td>
</tr>
<tr>
<td>Session * Health</td>
<td>1.566</td>
<td>4</td>
<td>.392</td>
<td>.136</td>
<td>.968</td>
<td>.018</td>
</tr>
<tr>
<td>Error</td>
<td>86.545</td>
<td>30</td>
<td>2.885</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>371534.000</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Model</td>
<td>20.890^a</td>
<td>8</td>
<td>2.611</td>
<td>.905</td>
<td>.525</td>
<td>.194</td>
</tr>
</tbody>
</table>

a. R Squared = .194 (Adjusted R Squared = -.020)

Table 1 shows that there was no a significant main effect of sessions, \((F (2,30) = 1.04, MSE = 3.02, p > .05)\), as well as there was also no a significant main effect of health, \((F (2,30) = .43, MSE = 1.25, p > .05)\), and there was no a significant interaction between of sessions and health, \((F (4,30) = .13, MSE = .39, p > .05)\). However, Post hoc analysis using Least Significant Difference indicated that in the Rest session, the mean number of Oxygen Saturation for three health states do not differ (\(M = 99.0, 98.0, \) and 98.0 for Normal, Hyperactivity, and Hypotension respectively). However, for the comparison between the Rest and Thai dance session, both Normal (\(M = 97.0)\) and Hyperactivity (\(M = 96.0)\) health were higher Oxygen Saturation than the Hypotension health (\(M = 93.0)\). As for in the Imagery session, all Normal (\(M = 99.0), Hyperactivity (M = 99.0), and Hypotension (M = 98.0) health do not differ from Rest session, and there was no significant difference when compared with Thai dance session.

Table 2 Tests of Effects between Sessions, Health, and Sessions * Health on Heart Rate

Dependent Variable: Heart Rate

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>81582.557</td>
<td>1</td>
<td>81582.557</td>
<td>532.439</td>
<td>.000</td>
<td>.947</td>
</tr>
<tr>
<td>Session</td>
<td>4892.793</td>
<td>2</td>
<td>2446.396</td>
<td>15.966</td>
<td>.000</td>
<td>.516</td>
</tr>
<tr>
<td>Health</td>
<td>177.020</td>
<td>2</td>
<td>88.510</td>
<td>.578</td>
<td>.567</td>
<td>.037</td>
</tr>
<tr>
<td>Session * Health</td>
<td>183.865</td>
<td>4</td>
<td>45.966</td>
<td>.300</td>
<td>.876</td>
<td>.038</td>
</tr>
<tr>
<td>Error</td>
<td>4596.727</td>
<td>30</td>
<td>153.224</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>365759.000</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>11118.974</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. R Squared = .587 (Adjusted R Squared = .476)

Table 2 shows that there was a significant main effect of sessions, \((F (2,30) = 1.04, MSE = 2446.39, p < .05)\), as well as there was also no a significant main effect of health, \((F (2,30) = .57, MSE = 88.51, p > .05)\), and there was no a significant interaction between of sessions and health, \((F (4,30) = .30, MSE = 45.96, p > .05)\).
Table 3 Pairwise Comparison between Sessions on Heart Rate
Dependent Variable: Heart Rate

<table>
<thead>
<tr>
<th>(I) Session</th>
<th>(J) Session</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>rest</td>
<td>Thai dance</td>
<td>-28.788</td>
<td>7.464</td>
<td>.001</td>
<td>-44.032</td>
<td>-13.543</td>
</tr>
<tr>
<td></td>
<td>imagery</td>
<td>4.333</td>
<td>10.107</td>
<td>.671</td>
<td>-16.308</td>
<td>24.974</td>
</tr>
<tr>
<td>Thai dance</td>
<td>rest</td>
<td>28.788*</td>
<td>7.464</td>
<td>.001</td>
<td>13.543</td>
<td>44.032</td>
</tr>
<tr>
<td></td>
<td>imagery</td>
<td>33.121*</td>
<td>7.464</td>
<td>.000</td>
<td>17.877</td>
<td>48.366</td>
</tr>
<tr>
<td></td>
<td>Thai dance</td>
<td>-33.121*</td>
<td>7.464</td>
<td>.000</td>
<td>-48.366</td>
<td>-17.877</td>
</tr>
</tbody>
</table>

Based on estimated marginal means
* The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Table 3 shows that Post hoc analysis using Least Significant Difference indicated that in the Rest session, the mean number of Heart Rate for three health states do not differ ($M = 72$, 68, and 68 for Normal, Hyperactivity, and Hypotension respectively). However, for the comparison between the Rest and Thai dance session, both Normal ($M = 90$) and Hyperactivity ($M = 70$) health used significantly higher Heart Rate than the Hypotension health ($M = 61$). As for in the Imagery session, all Normal ($M = 68$), Hyperactivity ($M = 66$), and Hypotension ($M = 67$) health do not differ from Rest session, but there was significant difference when compared with Thai dance session.

Table 4 Tests of Effects between Sessions, Health, and Sessions * Health on Body Temperature
Dependent Variable: Body Temperature

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>2.328*</td>
<td>8</td>
<td>.291</td>
<td>1.380</td>
<td>.245</td>
<td>.269</td>
</tr>
<tr>
<td>Intercept</td>
<td>17361.826</td>
<td>1</td>
<td>17361.826</td>
<td>82295.355</td>
<td>.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Session</td>
<td>.588</td>
<td>2</td>
<td>.294</td>
<td>1.393</td>
<td>.264</td>
<td>.085</td>
</tr>
<tr>
<td>Health</td>
<td>.722</td>
<td>2</td>
<td>.361</td>
<td>1.711</td>
<td>.198</td>
<td>.102</td>
</tr>
<tr>
<td>Session * Health</td>
<td>.048</td>
<td>4</td>
<td>.012</td>
<td>.057</td>
<td>.994</td>
<td>.007</td>
</tr>
<tr>
<td>Error</td>
<td>6.329</td>
<td>30</td>
<td>.211</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>52302.750</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>8.657</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. R Squared = .269 (Adjusted R Squared = .074)

Table 4 shows that there was no a significant main effect of sessions, ($F(2,30) = 1.13$, $MSE = .29$, $p > .05$), as well as there was also no a significant main effect of health, ($F(2,30) = 1.71$, $MSE = .36$, $p > .05$), and there was no a significant interaction between of sessions and health, ($F(4,30) = .05$, $MSE = .01$, $p > .05$). However, Post hoc analysis using Least
Significant Difference indicated that in the Rest session, the mean number of Body Temperature for three health states do not differ \((M = 36.6, 36.6, \text{ and } 36.0 \text{ for Normal, Hyperactivity, and Hypotension respectively})\). However, for the comparison between the Rest and Thai dance session, both Normal \((M = 36.4)\) and Hyperactivity \((M = 36.2)\) health were higher Body Temperature than the Hypotension health \((M = 35.0)\). As for in the Imagery session, all Normal \((M = 37.3)\), Hyperactivity \((M = 37.0)\), and Hypotension \((M = 36.7)\) health do not differ from Rest session, and there was no significant difference when compared with Thai dance session.

**Table 5** Tests of Effects between Sessions, Health, and Sessions * Health on Perception of Fatigue

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>30.357(^a)</td>
<td>8</td>
<td>3.795</td>
<td>2.367</td>
<td>.042</td>
<td>.387</td>
</tr>
<tr>
<td>Intercept</td>
<td>9.790</td>
<td>1</td>
<td>9.790</td>
<td>6.106</td>
<td>.019</td>
<td>.169</td>
</tr>
<tr>
<td>Session</td>
<td>22.815</td>
<td>2</td>
<td>11.408</td>
<td>7.115</td>
<td>.003</td>
<td>.322</td>
</tr>
<tr>
<td>Health</td>
<td>.977</td>
<td>2</td>
<td>.489</td>
<td>.305</td>
<td>.740</td>
<td>.020</td>
</tr>
<tr>
<td>Session * Health</td>
<td>1.037</td>
<td>4</td>
<td>.259</td>
<td>.162</td>
<td>.956</td>
<td>.021</td>
</tr>
<tr>
<td>Error</td>
<td>48.100</td>
<td>30</td>
<td>1.603</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>227.340</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Corrected Total</td>
<td>78.457</td>
<td>38</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

\(^a\) R Squared = .387 (Adjusted R Squared = .223)

Table 5 shows that there was a significant main effect of sessions, \((F(2,30) = 7.11, \text{ MSE} = 11.40, p < .05)\), as well as there was also no a significant main effect of health, \((F(2,30) = .30, \text{ MSE} = .48, p > .05)\), and there was no a significant interaction between of sessions and health, \((F(4,30) = .16, \text{ MSE} = .25, p > .05)\).

**Table 6** Pairwise Comparison between Sessions on Perception of Fatigue

<table>
<thead>
<tr>
<th>(I) Session</th>
<th>(J) Session</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.(^b)</th>
<th>95% Confidence Interval for Difference(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>rest</td>
<td>Thai dance</td>
<td>-2.279(^*)</td>
<td>.764</td>
<td>.006</td>
<td>-3.838 to -.719</td>
</tr>
<tr>
<td></td>
<td>imagery</td>
<td>-.333</td>
<td>1.034</td>
<td>.749</td>
<td>-2.445 to 1.778</td>
</tr>
<tr>
<td>Thai dance</td>
<td>rest</td>
<td>2.279(^*)</td>
<td>.764</td>
<td>.006</td>
<td>.719 to 3.838</td>
</tr>
<tr>
<td></td>
<td>imagery</td>
<td>1.945(^*)</td>
<td>.764</td>
<td>.016</td>
<td>.386 to 3.505</td>
</tr>
<tr>
<td>imagery</td>
<td>rest</td>
<td>.333</td>
<td>1.034</td>
<td>.749</td>
<td>-1.778 to 2.445</td>
</tr>
<tr>
<td></td>
<td>Thai dance</td>
<td>-1.945(^*)</td>
<td>.764</td>
<td>.016</td>
<td>-3.505 to -.386</td>
</tr>
</tbody>
</table>

Based on estimated marginal means

\(^*\) The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Table 6 shows that Post hoc analysis using Least Significant Difference indicated that in the Rest session, the mean number of Perception of Fatigue for three health states do not differ \((M = .00, .20, \text{ and } .10 \text{ for Normal, Hyperactivity, and Hypotension respectively})\). However, for the comparison between the Rest and Thai dance session, both Normal \((M = 3.0)\) and Hyperactivity \((M = 4.0)\) health used significantly higher level of Perception of Fatigue than the Hypotension health \((M = 4.6)\). As for in the Imagery session, all Normal \((M = .40)\), Hyperactivity \((M = .60)\), and Hypotension \((M = .80)\) health do not differ from Rest session, but there was significant difference when compared with Thai dance session.

Figure 1 shows that on a visual analysis of the four graphs clearly depicts strong relationship between Oxygen Saturation and Body Temperature of T1 (Normal), T2 (Hyperactivity), and T3 (Hypotension) among Rest, Thai Dance, and Imagery session drawing in the same way which were lowest at Thai Dance session and were sharply up at Imagery intervention session. On the other hand, generation of Heart Rate and Perception of Fatigue also came through the same trend, except Heart Rate level of T3 (Hypotension) at the Thai Dance session was lower than at rest session and of T1 (Normal) and T2 (Hyperactivity), and then were sharply down at imagery intervention session, in all participants.

Figure 1 Relationship of Health and Session Variables to Oxygen Saturation, Heart Rate, Body Temperature, and Perception of Fatigue

Discussion

The present study shows that there was no significant difference between the rest, 44-min Thai dance, and imagery conditions in BT and SpO² after both the Thai dance session (low BT and low SpO²) and after the warmth imagery intervention session (high BT and high SpO²). On the other hand, there was a significant difference between the rest, 44-min Thai dance, and imagery conditions in HR and FT after both the Thai dance session (low HR and low FT) and after the warmth imagery intervention session (high HR and high FT). Similar to research findings on sport and exercise, we found that 1) physical training
with resistance is an underlying cause of generation of tendon and muscle force from muscle tension (Erskine et al., 2010) producing the fatigue, as well as increases of heart rate (Rud & Hallén, 2009), as well as decreases of body temperature (Wendt et al., 2007; Périard, Thompson, Caillaud, & Quaresima, 2013; Bhasavanija, 2014), and oxygen saturation (White, Dawson, Landers, Croft, & Peeling, 2013), and 2) an imagery intervention increased skin temperature (Ohkuma, 1983; Bhasavanija, et al., 2011), muscle relaxation (Albright et al., 1990), and oxygen saturation (Bhasavanija & Morris, 2013), as well as decreasing heart rate (Bhasavanija, 2014). Theoretically, inactive skeletal muscle causes low metabolic rate and constant blood flow creating the body temperature of between 33 – 35°C (Wendt, et al., 2007), oxygen saturation of between 95–100%, and normal heart rate at rest (Zaykoski, 2011). In sport, energy use of muscle via metabolism generates high heart rate (Rud et al., 2009), and low body temperature (Wendt et al., 2007; Bhasavanija, 2014), particularly in prolonged exercise and/or 75% intensity exercise (Périard et al., 2013). Moreover, oxygen saturation is low during exercise and supplied during the recovery period (White, Dawson, Landers, Croft, & Peeling, 2013). Consequently, the higher body temperature and lower perceived fatigue in all participants indicates that their bodies were more relaxed after doing warmth imagery. This transfers to increased body warmth. Relaxation could reduce the risk of soft tissue injury among dancers during matches. Accordingly, all triplets generated low oxygen saturation and body temperature as the same way general human are during working out. Nevertheless, one of three triplets who had a hypotension generated low heart rate as an opposite way another two had done, however, their perceived fatigue levels were highly generated during working out. Finally, this study showed that at imagery intervention session, all triplets’ physiologies and fatigue can be retrieved which might be useful for physical activity recovery. To examine this further, it is necessary to examine these variables after physical activities following a warmth imagery intervention.

References


Abstract

The purpose of this study was to examine requests for needs of competency development of employees of the Sport Office, Ramkhamhaeng University, Thailand. Method: Participants were 54 Thai employees who were working for the Sport Office of Ramkhamhaeng University, age ranging from 24 to 60 years old. They were interviewed about their own requests for needs of competency development. The data was described as a composition writing style. Results: The needs responded in the high to low frequencies are 1) support of diversity (e.g. motivation, reward, facilities), 2) judgment (e.g. position promoting, decision of Head/Manager), 3) cooperation/teamwork (e.g. job description), 4) job/technical knowledge (e.g. special training), 5) innovation (e.g. modern technology devices), 6) quantity of work (e.g. action plan), 7) organisational competencies (e.g. changes of culture), 8) organization (e.g. using the rule to guide action), 9) staff development (e.g. workshop, training for talent), 10) technical competencies (e.g. specific skill), 11) commitment to safety (e.g. personal responsibility), 12) functional competencies (e.g. putting the right man on the right job), 13) behavioural competencies (e.g. development of individual efficacy), 14) communication (e.g. meeting for all working processes), 15) customer service (e.g. setting a rule of customer service), 16) quality of work (e.g. maintaining the high standard), 17) reliability (e.g. due on time), 18) problem solving (e.g. clearly considering the cause and effect), 19) attention to detail (e.g. focusing on the rules), 20) flexibility (e.g. the rule should be changed as followed situation), 21) quality control (e.g. based on standard), 22) responsiveness to requests for service (e.g. measuring the customers’ needs), 23), initiative and creativity (e.g. how to create a new way to succeed, how to solve a problem), 24) Core competencies (e.g. strategic strength), 25) management competencies (e.g. potential of individual’s management), respectively. Conclusion: This study indicated what employees mostly needed are motivation, reward, facilities, position promoting, decision of Head/Manager, job description, special training, and modern technology devices. We suggested that organiser should be taking these into account to achieve both personal and organisational goals. Also, this data may be rich pilot for the next study in organisation management for enhancement of employees’ competency.

Keywords: sport organisation employees; needs of competency development.

INTRODUCTION

In 1959, White R.W. first published an article related to the “COMPETENCE” which is a concept for association between performance and motivation theories. In 1978, Gilbert
suggested that this concept has relationship to performance improvement. However, bringing this concept for variety of use has been complicating understanding. In 1959, White R.W. first published an article related to the “COMPETENCE” which is a concept for association between performance and motivation theories. In 1978, Gilbert T.F. suggested that this concept has relationship to performance improvement. However, bringing this concept for variety of use has been complicating understanding. Some thinks the competency is depicted as one’s action as followed situation and context, which can be making different action in different situation in different time. Beside, in automatically acting to emergencies, one mostly behaves as the same way one did in the past, called a long-term memory behaviour, to conquer problem or to succeed. Consequently, setting a plan and taking a training to become high competent person is the most important thing to do for oneself or for undertaken persons (Bhasavani, 2016). However, research has found that it is not easy to assess competencies and competence development (Hamer, De Raadt, Barnes, Berry, Buckland, & Cajander, 2011). Because, taking a rich information in development problem from one is very difficult, so this should be addressed.

The Institute of International Studies (IIS-RU), Ramkhamhaeng University, was established in 1999 to expand its educational opportunities for the university’s international program to satisfy the ever-growing demand for international higher education. IIS-RU offers many academic disciplines in both English and Chinese programs, at the undergraduate and graduate levels, including the Ph.D. level for Thai and international students in conjunction with universities overseas, in an ongoing effort to embrace the spirit of internationalization. All of our courses in the English program are taught effectively by over 100 highly professional and internationally experienced visiting professors and lecturers from well-known leading universities in U.S.A., U.K., Canada, and various European countries, who take turns to come to conduct the courses. Also, the Chinese Program is taught by distinguished professors from prestigious Chinese universities. Currently, IIS-RU consists of students from 54 countries worldwide, including numbers of non-degree students studying an exchange semester. For sports at Ramkhamhaeng, within Ramkhamhaeng University’s main campus, the Ramkhamhaeng University Sport Office offers permanent and temporary activities for administers, lecturers, officers, students, and walking-in customers. Instance of, all ball sports, including the Thai national game as Takraw, as well as introduction and training for traditional Thai boxing as Muay Thai, and leisure as modern dance and gymnastic – the variety is overwhelming (Institute of International Studies, Ramkhamhaeng University, 2000). The purpose of this study was to examine requests for needs of competency development of employees of the Sport Office, Ramkhamhaeng University, Thailand.

METHODS

Participants. Participants were 54 Thai employees who were working for the Sport Office of Ramkhamhaeng University, age ranging from 24 to 60 years old. They were interviewed about their own requests for needs of competency development. The trial was created as a descriptive research, taking approximately one month for data collection. The data was described as a composition writing style.

INSTRUMENT

Interview

The questions were created as the following components of competency development:
1) Organisational competencies
2) Management competencies
3) Functional competencies
4) Behavioural competencies
5) Technical competencies
6) Organization
7) Quantity of work
8) Quality of work
9) Quality control
10) Communication
11) Commitment to safety
12) Staff development
13) Core competencies
14) Support of diversity
15) Customer service
16) Judgment
17) Reliability
18) Problem solving
19) Attention to detail
20) Flexibility
21) Cooperation/teamwork
22) Responsiveness to requests for service
23) Initiative and creativity
24) Job/technical knowledge
25) Innovation

**PROCEDURES**
We seek approval from Research Committee of Ramkhamhaeng University. Then, the interview was created as followed the competency development theory consisting of 25 components, and then was proved by three specialists who expert in this area as the content validity test. Moreover, we contacted the Sport Office of Ramkhamhaeng University for data collection. Before collecting the data, participants were given an introductory information on research aim and how to collect the data (such as voice recording) using an interview style.

**DATA ANALYSIS**
We grouped each component and evaluated as frequency (percentage), and then made an array from highest to lowest frequencies to examine which components were responded from most to lest, respectively.

**RESULTS**
Table 1 Descriptive Study by Grouping the Interview Responses

<table>
<thead>
<tr>
<th>Rank</th>
<th>Dependent Variables</th>
<th>Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Support of diversity</td>
<td>e.g. motivation, reward, facilities</td>
</tr>
<tr>
<td>2</td>
<td>Judgment (position promoting)</td>
<td>e.g. position promoting, decision of Head/Manager</td>
</tr>
<tr>
<td>3</td>
<td>Cooperation/teamwork</td>
<td>e.g. job description, clear action plan, dissolving behaviour activities</td>
</tr>
<tr>
<td>4</td>
<td>Job/technical knowledge</td>
<td>e.g. special training, advance training, workshop training, specific technician</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>5</td>
<td>Innovation</td>
<td>e.g. modern technology devices, development of knowledge of technology</td>
</tr>
<tr>
<td>6</td>
<td>Quantity of work</td>
<td>e.g. action plan, good assessment, talent, new technology equipment</td>
</tr>
<tr>
<td>7</td>
<td>Organisational competencies</td>
<td>e.g. changes of culture, development of organisers’ conception</td>
</tr>
<tr>
<td>8</td>
<td>Organization</td>
<td>e.g. using the rule to guide action, development of organising processes</td>
</tr>
<tr>
<td>9</td>
<td>Staff development</td>
<td>e.g. workshop, training for talent, self-conception</td>
</tr>
<tr>
<td>10</td>
<td>Technical competencies</td>
<td>e.g. specific skill, special training, advance training, workshop training</td>
</tr>
<tr>
<td>11</td>
<td>Commitment to safety</td>
<td>e.g. personal responsibility, always reminding the safety</td>
</tr>
<tr>
<td>12</td>
<td>Functional competencies</td>
<td>e.g. putting the right man on the right job, clearly setting the roles of each functions</td>
</tr>
<tr>
<td>13</td>
<td>Behavioural competencies</td>
<td>e.g. development of individual efficacy, contributing the motivation, maintaining the commitment</td>
</tr>
<tr>
<td>14</td>
<td>Communication</td>
<td>e.g. meeting for all working processes, documentary order</td>
</tr>
<tr>
<td>15</td>
<td>Customer service</td>
<td>e.g. setting a rule of customer service, good assessment of the service processes</td>
</tr>
<tr>
<td>16</td>
<td>Quality of work</td>
<td>e.g. maintaining the high standard, good assessment of the quality of work</td>
</tr>
<tr>
<td>17</td>
<td>Reliability</td>
<td>e.g. due on time</td>
</tr>
<tr>
<td>18</td>
<td>Problem solving</td>
<td>e.g. clearly considering the cause and effect</td>
</tr>
<tr>
<td>19</td>
<td>Attention to detail</td>
<td>e.g. focusing on the rules</td>
</tr>
<tr>
<td>20</td>
<td>Flexibility</td>
<td>e.g. the rule should be changed as followed situation</td>
</tr>
<tr>
<td>21</td>
<td>Quality control</td>
<td>e.g. based on standard, good assessment of control processes</td>
</tr>
<tr>
<td>22</td>
<td>Responsiveness to requests for service</td>
<td>e.g. measuring the customers’ needs, clearly setting the rule of the responsiveness to customers’ requests</td>
</tr>
<tr>
<td>23</td>
<td>Initiative and creativity</td>
<td>e.g. how to create a new way to succeed, how to solve a problem</td>
</tr>
<tr>
<td>24</td>
<td>Core competencies</td>
<td>e.g. strategic strength, reviewing the strategic procedures</td>
</tr>
<tr>
<td>25</td>
<td>Management competencies</td>
<td>e.g. increasing the potential of management of individual, department, and organisation</td>
</tr>
</tbody>
</table>

Table 1 shows that the needs responded in high to low frequencies are 1) support of diversity (motivation, reward, facilities), 2) judgment (position promoting, decision of Head), 3) cooperation/teamwork (job description), 4) job/technical knowledge (special training), 5) innovation (modern technology devices), 6) quantity of work (action plan), 7) organisational competencies (changes of culture), 8) organization (using the rule to guide action), 9) staff development (workshop, training for talent), 10) technical competencies (specific skill), 11) commitment to safety (personal responsibility), 12) functional competencies (putting the right man on the right job), 13) behavioural competencies (development of individual efficacy), 14) communication (meeting for working process), 15) customer service (setting a rule of customer service), 16) quality of work (maintaining the high standard), 17) reliability (due on time), 18) problem solving (clearly considering the
cause and effect), 19) attention to detail (focusing on the rules), 20) flexibility (the rule should be changed as followed situation), 21) quality control (based on standard), 22) responsiveness to requests for service (measuring the customers' needs), 23), initiative and creativity (how to create a new way to succeed, how to solve a problem), 24) Core competencies (strategic strength), 25) management competencies (potential of individual's management), respectively.

CONCLUSION

This study indicated what employees mostly needed are motivation, reward, facilities, position promoting, decision of Head/Manager, job description, special training, and modern technology devices. What these data can be explained are that setting a plan and taking a training to become high competent person is the most important thing to do for oneself or for undertaken persons (Bhasavanija, 2016), a it is not easy to assess competencies and competence development (Hamer, De Raadt, Barnes, Berry, Buckland, & Cajander, 2011) because taking a rich information in development problem from one is very difficult, so this should be addressed. For this study, we suggested that organiser should be taking these into account to achieve both personal and organisational goals. Also, this data may be rich pilot for the next study in organisation management for enhancement of employees' competency.

REFERENCES

The Effects of Listening to Music and Instrumental on Ergometer Duration
Phichayavee Panurushthanon
1 Srinakharinwirot University, Thailand

Abstract
The purposes of this present study were to study and compare the effects of listening to music and instrumental on ergometer duration. Participants were twelve students of Sports Sciences Department of Srinakharinwirot University (Male = 6, Female = 6), age ranging from 18 – 19 years old ($M = 18.41$, SD = .15). They all were assigned to listen to three types of music (music, instrumental, none-music or instrumental) during ergometer. Intensity of 70watts was begun and increased 35watts in every 4 min in which subjects would maintain 70-75 rounds per min till they felt exhausted, and then recorded their bicycling duration and maximum heart rates. Results showed that after listening three types of music, 1) participants produced three ergometer durations of music, instrumental, none-music or instrumental ($M = 12.19$, SD = .92; $M = 11.29$, SD = .89; $M = 10.96$, SD = .75) respectively, 2) listening to music and none-music during ergometer duration affected on statistically significant differences of duration, Alpha level at 0.05, 3) listening to music and instrumental during ergometer duration affected statistically significant differences of duration, Alpha level at 0.05, and 3) listening to music affected highest duration of ergometer, and then to instrumental and to none-music, respectively. This study suggests that study of components of music and instrument can explain which one should be used for exercise enhancement which is based on thought, and motivation in taking longer time to do exercise. Although, music reported greater data than another two, however the two produced a little bit difference of heart rate and exercise duration from music. So, they should be taken into account for particular purpose.

Keywords: music; instrumental; none-music or instrumental; bicycle ergometer

INTRODUCTION
Sport scientists have been looking for the best cause and effect of human exercise. Innovation of technology of exercise has been interesting much, particularly in physiology and psychology to be useful for exercise potential. Yodcom (2005) revealed that effects of exercise on health were increases of cardiovascular endurance, inspiratory, muscle strength, and body composition, so exercise is very useful for human. Main components of exercise, affecting physical fitness, joyful, happiness to what is doing or using during exercise, consists of type, intensity, frequency, and duration. Exercise with listening to music for health has been wildly used, as it impacts changes of physiology and psychology. This can also cause change of body electrical potential influencing cutaneous circulation, pulse rate, and blood pressure, and also affect conduction or reduction of muscle power (Alvin, 1966). Moreover, music exercise promotes physical and mental health with listening music together with exercise causing motivation for exercise which is based on music. Music exercise consists of content, rhythm, tempo, and volume. These can induce motivation and performance (Sriviboon, 2003). Regarding to Diamond, & Beaumont (1974) revealed that
listening to the music by ear nerve, stimulus detector transform sound wave to neuron then sending to the brain to operate immune system. Moreover, Biley (1992) suggested that rhythmic has relation to heart rate in which fast rhythmic music produces higher level of heart rate. Seaward (1997) noted that instrumental creates more relaxation than music. Consequently, this study purposed to study and compare the effects of listening to music and instrumental on ergometer duration.

Methods

Participants
Participants were twelve students of Sports Sciences Department of Srinakharinwirot University (Male = 6, Female = 6), age ranging from 18 – 19 years old (M = 18.41, SD = .15). They all were assigned to listen to three types of music (music, instrumental, none-music or instrumental) during ergometer. Intensity of 70watts was begun and increased 35watts in every 4 min in which subjects would maintain 70-75 rounds per min till they felt exhausted, and then recorded their bicycling duration and maximum heart rates.

Research Tools
Research tools which were used for this study were following;
1. Monark Ergomedic 828 E, Health Care International, Sweden
2. Ear Phone, JBL, Model: SYNCHROS E50BT, Harman International Industries Inc, China
3. MP3 IPhone Application, Model: S6, Apple Computer Company, Japan
4. Heart Rate Monitor, Model: Polar H7, Industry Canada, Canada
5. Polar Beat Application, Industry Canada, Canada
7. Height Monitor

Procedures
I seek approval from Human Research Ethics Committee of Srinakharinwirot University. Then, Purposive Sampling was used to find out participants. Ergometer Tests was created, and examined the content validity by 5 physiological scientists and the reliability by test – retest method. All tools were tested before used in the study. Music and instrumental were chose such as Faded (Alan Walker), attention (Charlie Puth), closer (the Chansmokers), despacito (Luis Fonsi, Daddy Yankee), and ride (Twenty Pilots). Participants responded the consent form to involve in this study. Cross-over Design was used for tests of effects of listening music, two day per week (Tuesday and Friday) as testing six participants for one day and another six for another day, at 03:00 – 06:00pm, for three weeks. To begin with, participants sat and read for five minutes, at the moment, they were tested their heart rates during rest, then got a movement stretching their leg muscle, and started biking on Monark ergometer by warming up for the first five minutes with 70-watt intensity, as well as loading 35-watt intensity at every four-minute testing time, and maintaining 70-75rpm per round. At the same time, I recorded their heart rates at every one-minute time till they could not maintain 70rpm per round per minute meaning that they got exhaustion and stop testing of each participant. After that, they were assigned to get muscle cooling down for five minutes. At the end of this study, I thanked all participants.
Data Analysis

1. Mean and Standard Deviation were used to describe dependent and independent variables, such as age, height, weight, body mass index, rest-heart rate, ergometer duration till getting exhaustion through three types of music on every-one-minute heart rate.

2. Evaluation of variance of exercise duration among three types of music by using the One-way Analysis of Variance for repeated measures.

3. Comparison of exercise duration among three types of music for by using Bonferroni, Alpha level at 0.05.

Results

Table 1 Mean and Standard Deviation of General Information

<table>
<thead>
<tr>
<th>General Information</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>18.41</td>
<td>0.15</td>
</tr>
<tr>
<td>Weight</td>
<td>63.91</td>
<td>2.39</td>
</tr>
<tr>
<td>Height</td>
<td>168.67</td>
<td>2.51</td>
</tr>
<tr>
<td>BMI</td>
<td>22.46</td>
<td>2.75</td>
</tr>
<tr>
<td>Rest Heart Rate</td>
<td>83.83</td>
<td>9.06</td>
</tr>
</tbody>
</table>

Table 1 shows participants had an average age of 18.41 years old, 63.91kg, 168.67cm, 22.46kg/m², and 83.83time/sec.

Table 2 Mean and Standard Deviation of Ergometer Duration in Three Conditions

<table>
<thead>
<tr>
<th>Conditions</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Music</td>
<td>12.19</td>
<td>0.92</td>
</tr>
<tr>
<td>Instrumental</td>
<td>11.94</td>
<td>0.89</td>
</tr>
<tr>
<td>Non-Music</td>
<td>10.96</td>
<td>0.75</td>
</tr>
<tr>
<td>Total</td>
<td>11.70</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Table 2 shows that ergometer with music condition generated greatest duration.
Table 3 Paired-Comparison of Ergometer Duration among Three Conditions

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Music</th>
<th>Instrumental</th>
<th>Non-Music</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>12.19</td>
<td>11.94</td>
<td>10.96</td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td>0.46</td>
<td>0.006*</td>
</tr>
<tr>
<td>Instrument</td>
<td></td>
<td></td>
<td>0.008*</td>
</tr>
<tr>
<td>Non-Music</td>
<td>11.94</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*<.05

Table 3 shows that there was significant difference of heart rate between music condition and non-music condition, as well as Instrumental condition and non-music condition, Alpha level at 0.05.

Table 4 Mean and Standard Deviation of Heart Rate in Three Conditions

<table>
<thead>
<tr>
<th>Conditions</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Music</td>
<td>151.05</td>
<td>3.56</td>
</tr>
<tr>
<td>Instrument</td>
<td>150.61</td>
<td>2.79</td>
</tr>
<tr>
<td>Non-Music</td>
<td>146.84</td>
<td>4.06</td>
</tr>
<tr>
<td>Total</td>
<td>149.50</td>
<td>2.31</td>
</tr>
</tbody>
</table>

Table 4 shows that ergometer with music condition generated highest heart rate.

Table 5 Paired-Comparison of Heart Rate among Three Conditions

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Music</th>
<th>Instrumental</th>
<th>Non-Music</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>151.05</td>
<td>150.61</td>
<td>146.84</td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td>1.00</td>
<td>0.28</td>
</tr>
<tr>
<td>Instrument</td>
<td></td>
<td></td>
<td>0.42</td>
</tr>
<tr>
<td>Non-Music</td>
<td>150.61</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*<.05

Table 5 shows that there was no a significant difference of heart rate among three conditions, Alpha level at 0.05.

Discussion

The results of this study are similar to the previous studies are that 1) music can enhance duration of exercise significantly, because listening to music creates more joyful than not listening (Murrock, 2002) as well as alerts body systems causing the mental relaxation, fatigue reduction, and motor coordination (Urakawa, & Yokoyama, 2005; Szabo et al, 1999), and stress reduction and extends exercise duration (Yamashitas et al, 2006). Theoretically, when listen to music, sound of music is transformed as the neuron signal and sent to auditory apparatus in thalamus and corticol in conscious state based on interesting, thinking, remembering, and imagining (Alvin, 1966). Opposite with study of Seaward (1997) is that instrumental can enhance relaxation and reduce anxiety more than music, 2) music can cause higher heart rate than instrument and non-music respectively, because music
produces sound louder than instrument related to heart beating, as a reason of music also generates sound wave speeding through out body for which arterial vessel resonance occurs (Guzzetta, 1997). This study suggests that study of components of music and instrument can explain which one should be used for exercise enhancement which is based on thought, and motivation in taking longer time to do exercise. Although, music reported greater data than another two, however the two produced a little bit difference of heart rate and exercise duration from music. So, they should be taken into account for particular purpose.

References


The Effectiveness of Psychological Skills Training (PST) Program on Netball Shooting Performance

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Abstract

The study aims to investigate the effect of Psychological Skills Training (PST) Program on netball shooting performance. The experimental method was used on three groups of an 8-week intervention: combination of diaphragmatic breathing (DB) and imagery (IM), plus physical practice (PP) - Group 1 (G1); combination of DB and self-talk (ST), plus PP – Group 2 (G2); and control group – only PP, as Group 3 (G3). The subjects who achieved a criterion of equal to or less than 36 of the VMIQ-2 subscales were recruited as G1 (n=16) whereas, the remaining subjects were equally divided randomly into G2 (n=15) and G3 (n=15). A SPANOVA was conducted to assess the impact of two different treatments and a control group on netball shooting performance score, across the two periods of pre-post intervention. There was a significant interaction between groups and time (Wilks Lambda = .612, F(2,43)=13.61, p=<.001). There was also a substantial main effect for time (Wilks Lambda = .515, F(1,43)=40.507, p< .001, partial eta squared=.485) with all groups showing an increment in shooting performance score across the two time periods. The main effect comparing the two treatments and a control group was significant, F(1,43) = 11.80, p< .001, with partial eta squared =.354. Post hoc Tukey test indicated that the Group 1 and Group 2 differ significantly at p<.05 and the Group 1 and Group 3 differ significantly at p<.05. However, the Group 2 was not significantly different from the Group 3. The results indicated that netballers of different skill used of PST, either G1 or G2 were found to improve the netball shooting performance. It was also showed that G1 has better netball shooting performance rather than G2 and G3. As to highlighting, that the principles and practical applications of these most basic psychological skills can be taught in easier ways and probably in a relative short period of time among youth athletes.

Keywords: Psychological Skills Training, imagery, self-talk, diaphragmatic breathing, netball shooting

INTRODUCTION

As all other ball games, scoring is the most important characteristic for the competitive success of a netball team (Navin, 2012). A netball team consists of seven players on the court at one time. Each position has different court restrictions and roles within match play, which is demanding the shooting performance of the two players called Goal Shooter and Goal Attack in defining the goal (Davidson & Trewartha, 2008). Open skill such as netball shooting occur in a changing, and predictable environment such need to regularly move and adapt with different shooting distance aiming to the basket (Stoker et al., 2017). As a player, she tended to demonstrate few repetitions of movement activities and demonstrated least time walking, jogging and running, and greatest percentage of time standing (Davidson &
Trewartha, 2008). Therefore, training should be tailored to suit the needs and capabilities of particular players (Fox, Spittle, Otago, & Saunders, 2013). Various performance indicators have been used to try to understand the psychological demand of training (Hegazy, Sherif, & Houta, 2015).

Psychological aspects may influence the results, for example anxiety prior to competition (Fernández-Fernández et al., 2015) or during daily event (Garza & Ford, 2009) could cause rise in heart rate; or the visualization and concentration-attention control during the task completion could cause the performance of motor skills (Hegazy et al., 2015); or the relaxation exercise was used to gain a relaxed state so that the affirmation statements could be used in conjunction with relaxation during the preparation phase of a physical activity (Rogerson & Hrycaiko, 2002); or could be used during the activity itself (Fraser, Steffen, & Elfessi, 2001). Thus, it is very common that the main emphasize is to develop one’s performance through mental training (Weinberg & Gould, 2014). The argument is whether those mental preparation strategies could be effectively works, either single or a combination of techniques (Weinberg, Chan, & Jackson, 1983).

Weinberg and Gould (2014) responded that the PST program was effective to improve athletic performance and success. It was either with one single skills like self-talk training program such soccer skills (Johnson, Hrycaiko, Johnson, & Halas, 2004), swimming backstroke (Zetou, Nikolaos, & Evaggelos, 2014), cycling time trial (Barwood, Corbett, Wagstaff, McVeigh, & Thelwell, 2015), or imagery training program such netball shooting (Fowler, 2010; Halim & Ismail, 2016; Wakefield & Smith, 2009), soccer passing (Seif-Barghi, Kordi, Memari, Mansournia, & Jalali-Ghomi, 2012), soccer free kick accuracy (Hallsson, 2013), volleyball serve (Velentzas, Heinen, & Schack, 2011), basketball free throw shooting (Samis-Smith, 2015) proven interesting significant results towards athletes performance, or the use of package approach - imagery, goal setting, and variations of self-talk used in Blakeslee and Goff (2007), Wolfram and Micklewright (2011), Kerkez, Kulak, and Aktas (2012) and Montgomery, Ross, Perry, and Hansen (2017). Interestingly, even with large numbers of interventions provide by the researchers, there is still lack of information on the comparison study between different combinations of mental strategy based on the assessment on the same task-performance.

When athletes have too much energy or anxiety, relaxation strategies are often helpful (Pineschi & Di Pietro, 2013) and one of key skill and happens quickly is diaphragmatic breathing (Fraser et al., 2001). When athletes are too low in energy, they often feel tired and flat and may suffer a “let down” (Loehr, 1994). Therefore, it enables increase the ability to concentrate largely in combination with concentration, imagery or self-talk prior to practice (Harris & Harris, 1984). Vealey and Forlenza (2015) describe imagery as “using one’s sense to create or re-create an experience in the mind”. This technique can be used by athlete with any cognitive strategy such as to use it effectively. Few of the literature is on using imagery in mental skill training with few controlled studies that get at how imagery works (Glynn, Gilbert, & Lewis, 2013; Smith, Wright, Allsopp, & Westhead, 2007) and what might make imagery more effective (Hallsson, 2013). As one of the cognitive strategy that been combine with imagery by several researchers is self-talk as self-give instructions; reinforce or interpret thoughts, feeling or actions; or carry on an internal dialogue within oneself.

Whilst there is evidence in the use of imagery and self-talk independently of one another, it might be possible that they also cause preferences for the use of one strategy rather than the other to be formed. For example, previous research has revealed that athletes tend to place more emphasis on the use of imagery as a pre-competitive strategy (Munroe, Giacobbi Jr, Hall, & Weinberg, 2000; Weinberg, 2003) and self-talk as a strategy to be used
during competition (Gammage, Hardy, & Hall, 2001; Hardy, Hall, & Hardy, 2005). Moreover, it has been suggested that self-talk may lend itself better to use during competition than imagery, as it is a quicker and easier strategy to employ (Hardy et al., 2005).

However, as to make a comparison there were findings suggested the combination of imagery with relaxation and/or self-talk could also produce the positive result in enhancing performance (Cumming, Nordin, Horton, & Reynolds, 2006; Vealey, 1986). In addition, a number of research studies have demonstrated that imagery combined with relaxation is more effective than imagery alone (Hallsson, 2013; Weinberg, Seabourne, & Jackson, 1981). It make a great sense since it is usually suggested that relaxation enhances the clarity of the athlete’s imaging (Harris & Harris, 1984). Accordingly, self-talk was hypothesized can help the athlete increase the self-confidence when combining with imagery. However, Cumming et al. (2006) revealed that combination of these two had no effect on self-confident but the self-talk may helping on cues while imagine. While, past research has demonstrated the positive effects of single used of focus self-talk for improving performance such in basketball (Chroni, Perkos, & Theodorakis, 2007), tennis (Van Raalte, Cornelius, Brewer, & Petitpas, 2006) and throwing-and-jumping events (Goudas, 2006) performance.

**Statement of the Problem**

For some reason the literature indicates that many coaches exclude psychological skill training (PST) from the training and preparation of their athletes (Freitas, Dias, & Fonseca, 2013a; Grobbelaar, 2007) and a lack of knowledge about PST (Freitas, Dias, & Fonseca, 2013b; Grobbelaar, 2007). However, there have been possible explanations from athletes’ point of view for the need of development and implementation of PST including the awareness to improve poor psychological preparation for competitions (Van Den Heever, Grobbelaar, & Potgieter, 2007). Another possible explanation reported that more than 50% of the youth athletes claimed that they “never heard or do not know” about meditation, autogenic training, Progressive Muscular Relaxation, concentration training and imagery (Ong, 2004). All of these feedbacks illustrate the importance of mental strategies in helping athletes improve their performance in their respective sports. To date, countless studies have proven the effectiveness of psychological strategies to improve athletes’ performance and yet the number of research involved in netball and Malaysia contexts is still small. Such a trend has created a general concern of whether the huge number of PST programs been designed has any way could be applied to assess shooting-task performance among netball shooters. Thus, the aim of this study was to determine the effectiveness of (PST program in shooting-task performance on netball shooters.

**METHODS**

**Participants**

Forty-six netball athletes’ age between 13 to 16 years old from Kuala Lumpur Sports School participated in the present study. The subjects were recruited as not to be involved in official competitions such as Malaysia Sport (SUKMA) or Malaysia School Sports Council Sport (MSSM) during the intervention period. The athletes not an elite standard and none of them reported having any experience of formal PST program. The study was performed after approvals of the University’s Research Ethics Committee was obtained, and followed by having the sanctions from Ministry of Education Malaysia (MOE) and Kuala Lumpur Federal Territory Education Department. As the subjects were under 18 years of age, subjects along with their parents and coaches were provided information about the study.
Procedures

The subjects were recruited to three groups: Group 1 – combination of diaphragmatic breathing and imagery, plus physical practice (DB and IM, + PP) with n=16, Group 2 – combination of diaphragmatic breathing and self-talk, plus physical practice (DB and ST, + PP) with n=15, control group – physical practice (PP) with n=15. The subjects who achieved a criterion of equal to or less than 36 of the VMIQ-2 subscales were recruited as Group 1 members. Whereas, the remaining thirty subjects were equally divided randomly into the experimental Group 2 and Group 3. The intervention groups performed three times per week with 30 minutes of PST and followed by 30 minutes of PP per session at different days for eight weeks that in total was 24 sessions for each group. Except, the control group, which only did for 30 minutes of PP in a session. No information about the purpose of the study was given to the subjects until they completed the experiment.

The Intervention Schedule

In familiarization phase, the subjects in Group 1 and Group 2 had a session in which they received instruction and training on how to perform the PST interventions, respectively. The subjects were familiarized with what will be done, and what is expected from them could become grateful assistance to subject who has never practiced shooting even though they are netball players. The shooting-task training protocol (PP) session also was explained and the subjects received instruction on how to perform shooting during the sessions provided to them. Due to varying levels of shooting experience and their ability, the subjects performance considering only after they were familiarize with the expected tasks to maintain consistency in the following 8 weeks intervention period. The duration of each session for both intervention groups was lasted for 30 minutes session; 10 minutes with DB training and 20 minutes with either IM training or ST training. After completing the 30 minutes PST session, the subjects were continued with 30 minutes of PP.

DB and imagery training

The subjects participated in the DB while lying in a quiet and comfortable room. The researcher lead the session and read the relaxation script in about 10 minutes, while the research assistance was utilized to monitored the subjects. The subjects were reminded that they should enable to fell the relaxation after they finished with the breathing exercise. The subjects were then asked to continue lay-down and continue with the instructional imagery script that was read out to them for another 20 minutes. As short as possible, remind the subjects how exactly the technique can incorporated into their PP later.

DB and ST training

The purpose of performing DB before conducting ST training is the same as in conducting for Group 1. The subjects participated in the DB while lying in a quiet and comfortable room and lasted approximately 10 minutes. While the researcher led the session and read the script of relaxation the research assistance was utilized to monitored the subjects. The subjects were then asked to continue lay-down and continue with the self-talk script that was read out to them for another 20 minutes. The steps are simplify by address each or more than one steps in making a successful shooting to four components which can gives a single cue word – ‘check’, ‘aim’, ‘flick’ and ‘follow-through’ to instruct where they had to focus their attention for shooting. The self-talk phrases and self-talk instruction cues that need to be self-generated by the subject should be recite just before they continue with their PP afterwards.
Physical Practice (PP)

The basic part of this shooting task in allowing a subject to perform a shooting was refer to the technical parts recommended by Navin (2012). The subject had performed 20 trials in the first round at a distance of 1.5 meters and 3.0 meters from the post and be given a break for 3 minutes before continuing 20 trials in the second round for the other distance.

Measures

This study was an experimental design involved three phases:
Phase 1: A baseline phase that the researcher needs to indicate the imagery ability of the subjects. Then, the subjects were divided into three groups. The data was collected during pretest activity.
Phase 2: The intervention phase, lasting for eight weeks for the intervention groups – Group 1 and Group 2, and no intervention was provided to the control group – Group 3.
Phase 3: The post-intervention phase, the data was collected on the last session.

Vividness of Movement Imagery Questionnaire-2 (VMIQ-2)

The athletes were asked to answered VMIQ-2 to indicate their imagery ability (Roberts, Callow, Hardy, Markland, & Bringer, 2008). The subjects who achieved a criterion of equal to or less than 36 of the VMIQ-2 subscales were recruited as Group 1 members (i.e. DB and IM, + PP). The criterion indicated that their imagery ability was at least moderately clear and vivid (Lawrence, Callow, & Roberts, 2013; Roberts et al., 2008). Whereas, the remaining thirty subjects were equally divided randomly into the experimental Group 2 (i.e. DB and ST, + PP) and Group 3 (i.e. PP only).

Netball Shooting Task

Even though there was several shooting style across the world, but the preferred technique has changes from a two-handed shot to the one-handed high release shot known as Australian shooting style was selected for this study (Ghazali & Ali, 2014; Lim, Choo, Rosnah Safee, & Tan, 2011; Shakespear & Caldow, 2009). Two assessors recorded each attempt using the scoring scale which 1 point if the ball goes directly into net and 0 point if the ball do not goes into net. Shooting task performance was measured by summing the scores for 40 attempts. The summation scores range from 0 to 40 points.

RESULTS

Kolmogorov-Smirnov and the Levene’s test showed that the assumption of normality was met within each group. The Levene’s test and Box’s Test of Equality of covariance matrices were not significant value (p>.05) and thus, parametric tests can be applied. During pretest, Group 1 (i.e. DB and imagery) had the same mean score with Group 2 (i.e. DB and ST) (mean = 4.00). Group 3 as control group (mean = 3.20) has the lowest mean score. However, for the post-test, the mean score for Group 1 (mean = 13.94) was higher than Group 2 (mean = 6.87). The mean score for control group was remain the lowest (mean = 4.40). The graph of the profile plot illustrated in Figure 1 clearly indicated that the shooting performance for the treatment groups increase over time. However, the mean value of Group 1 outperformed the Group 2 during the posttest. Group 2 showed marginal increase of mean value during the posttest. For the control group, the mean value was increase over
time; however, the increasing of the mean value of treatment groups was much better than the control group.

![Estimated Marginal Means of MEASURE_1](image)

**Figure 1: Profile Plots to Indicate the Pre-Test and Post-Test for Shooting Performance Means of the Three Groups Based on the Time**

A split-plot analysis of variance (SPANOVA) was conducted to assess the impact of two different treatments and a control group on athletes’ shooting performance score, across the two time periods of pre-post intervention. There was a significant interaction between groups and time (Wilks Lambda = .612, \(F(2,43) = 13.61, p<.001\)). There was also a substantial main effect for time, (Wilks Lambda = .515, \(F(1,43) = 40.507, p < .001\), partial eta squared=.485) with all groups showing an increment in shooting performance score across the two time periods (Table 1).

<table>
<thead>
<tr>
<th>Table 1: Multivariate Tests</th>
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<tbody>
<tr>
<td><strong>Effect</strong></td>
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<td>time</td>
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The result in Table 2 showed that the main effect comparing the two treatments and a control groups was significant, \(F(1,43) = 11.800, p < .001\), with partial eta squared =.354. Post hoc Tukey test indicated that the Group 1 and Group 2 differ significantly at \(p<.05\) and the Group 1 and Group 3 differ significantly at \(p<.05\). However, the Group 2 was not
significantly different from the Group 3. The summarization of mean difference showed that the subjects of different treatment from Group 1 and Group 2 were found effectively in increasing shooting performance. It was also showed that the Group 1 has better shooting performance rather than Group 2 and the Group 3 (Table 3).

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.*</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>3383.651</td>
<td>1</td>
<td>3383.651</td>
<td>183.445</td>
<td>.000</td>
<td>.810</td>
</tr>
<tr>
<td>Group</td>
<td>435.299</td>
<td>2</td>
<td>217.650</td>
<td>11.800</td>
<td>.000</td>
<td>.354</td>
</tr>
<tr>
<td>Error</td>
<td>793.135</td>
<td>43</td>
<td>18.445</td>
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<td></td>
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</tbody>
</table>

**Table 2: Table of Tests of Between-Subjects Contrasts**

**DISCUSSION**

The purpose of this study was to investigate the influence of Group 1, Group 2 and Group 3, specifically expecting result from the intervention groups on the improvement of the netball shooting-task performance. The athletes of different treatment from Group 1 and Group 2 were found effectively in increasing shooting performance. It was also showed that the Group 1 has better shooting performance rather than Group 2 and the Group 3. Given the goal as to increase the performance, some findings claimed that without the use of other mental strategy and follow by PP, IM or ST alone could also fulfill the goal (Boubouki & Perkos, 2014; Fowler, 2010; Kolovelonis, Goudas, & Dermitzaki, 2011; Wakefield & Smith, 2009). Fortunately, this study, Aghdasi and Touba (2012), and Hemayattalab and Movahedi (2010) revealed that the combination of PP leads to better result than separate practice. This may explained by the fact that young athlete may feel that their body well by having the PP and they understand the importance of focusing on the PST techniques that they been taught. Probably, they may felt the improvement on the relaxation mode that can gain in shorter period of time, or able to lessen the pressure which accompanying them during the practices by having either, IM or ST.

Some findings revealed on the effectiveness of PST program among adult athletes which contain almost similar program with these studies (Fowler, 2010; Peluso, Ross, Gfeller, & LaVoie, 2005; Thelwell, Weston, & Greenlees, 2010). Nevertheless, Capranica and Millard-Stafford (2011) had investigate the effect of PST with young athletes, which found positive results for its effects on performance. Interestingly, most of them started training and
participating in competitions early in their childhood. For example, this perspective was supported by Frick, Daum, Wilson and Wilkening (2009) which the finding proved that the effectiveness of IM training in adult athletes cannot be transferred one-to-one to young athletes because there is a difference with respect to motor skills. Some more, this is reinforced with insight that the association between motor imagery ability and motor performance may get stronger with age (Caeyenberghs, Tsoupas, Wilson, & Smits-Engelsman, 2009). This study may promote comprehensive PST program on future study promoting motor learning in young athletes from different kind of sports and may consider on under some conditions such as kinesthetic experiences to the judgement task.

The practical part in this study was provided basic knowledge from the practices of IM and ST (cognitive strategy) in separate intervention with each of them was used just after DB (somatic strategy). Subjects were thought three easier PST techniques to use during their practices. Reason for that might be that these are more interesting PST techniques for younger athletes. In this study, it was expected that athletes may had some difficulties to find out right state of mind and make it work but after few repetitions, they were able to use ST than the IM. Even though, imagery was easier too but it may needs more time to feel comfortable for practices than self-talk. This was supported by Peluso et al. (2005) that who engaged in less than ten hours of athletic activities per week preferred self-talk strategy. However, this study reported that the DB and IM group was better than DB and ST group though the subjects were engaged in three hours-per-week programs, equally for both techniques. It was probably because of the recruitment basic on DB and IM group was based on the average criteria on their imagery ability (Lawrence et al., 2013; Roberts et al., 2008). Specifically, It could be claim that the Group 1 intervention can be potentially use and should be replicate by other researcher since the result of this study proven was not interfere by the imagery ability of the athletes.

CONCLUSION

Key findings included that either the athletes may use both type of intervention the combination of DB and IM, or DB and ST probably with the reason of using breathing technique as a strategy to overcome stress and getting calmer and gaining focus before continue with either IM or ST technique. Therefore, the athletes are able to focus more in their way to perform the shooting task. Interestingly, probably the function of IM and ST were found to serve for different purpose. The IM use to plan for making a successful shot, while, the ST use to create and maintain the psychological state while making a successful shot. As to highlighting, that the principles and practical applications of the most basic psychological skills can be taught in easier ways and probably in a relative short period of time among youth athletes (Montgomery et al., 2017).

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Full Conference Paper 10

Confirmatory Factor Analysis of Decisional Balance Scale Among Undergraduate Students in Health Campus, Universiti Sains Malaysia (USM)

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Abstract

Decisional balance is the perceived of positive and negative aspects that are related to individual’s behavioural changes. It was widely used to link with stages of change and had become an important construct in the Transtheoretical Model (TTM). 

**Purpose:** The aim of this study was to determine the validity and reliability of decisional balance scale for exercise among undergraduate’s students in USM using Confirmatory Factor Analysis (CFA). 

**Method:** A cross-sectional study was carried out to test among USM undergraduate students who took part in co-curriculum. By using purposive sampling, students were informed that their participation is entirely voluntarily to fill in self-administered 10-items questionnaire using 5-point Likert scale before the co-curriculum session. The questionnaire was collected after the co-curriculum session ended. Data was analysed using Mplus version 8 software.

**Results:** A total of 300 students participated in this study. Majority of the students were female (79.3%), and were Malay (67.3%) with the mean of 2.74 times exercise per week, and mean of 43.37 minutes exercise per session. For measurement model assessment, decisional balance scale showed a good fit index: RMSEA= 0.042 (90% CI= 0.013-0.064), CFI= 0.981, TLI= 0.973, SRMR=0.054. Composite reliability showed good construct reliability for both factors with 0.785 (0.744-0.826) for Pros and 0.834 (0.806-0.863) for Cons.

**Conclusion:** The findings suggest that decisional balance scale was valid and reliable to test Malaysian undergraduate students.

**Keywords:** Confirmatory Factor Analysis (CFA), Decisional balance scale, Transtheoretical Model (TTM), reliability, validity, students

INTRODUCTION

Physical activity is an important determinant of physiological and psychological health, protecting against several common diseases (World Health Organisation, 2005). It is a common knowledge that regular physical activity is important in preventing many diseases and medical conditions such as ischemic heart disease, hypertension, obesity, diabetes, breast and colon cancer (Molanorouzi, Khoo, & Morris, 2015). Hence, regular physical activity can improve the overall quality of life and enhance life satisfaction.
An individual need to have a good behaviour and attitude to engage in exercise. People tend to change exercise habit by themselves after considering the advantages and disadvantages of exercise. They will evaluate and encounter the consequence before changing their exercise habit. People consider the costs compared to the advantages when deciding whether to make change or not (Abbaspour, Farmanbar, Njafi, Ghiavand, & Dehghankar, 2017). Thus, by weighing the pros and cons from time to time, they will decide the best strategies for themselves. Decisional balance is a good method to focus on the importance of perceived positive and negative outcome of a behaviour change. According to the individual who successfully changes new behaviour, they will know the pros of behaviour change more than cons and the pros of exercise must appear more than cons (Abbaspour et al., 2017). Normally, people tend to have positive views and belief at the early stage and negative views and belief at last stage.

Decisional balance is a multidimensional set of values perceived positive aspects as advantages (pros) and negative aspect disadvantages (cons) that are associated with behavioural change (Bernard et al., 2014). The two components of decisional balance, the pros and cons were based on the theoretical model of decision making developed by Janis and Mann (1977) and the perceived of positive and negative aspects that are related to individual’s behavioural changes. Examples of pros in exercise were self-esteem, whereas examples of cons were cost, and physical discomfort. The decisional balance was linked with the stages of change where it is also theorised that decisional balance increased from pre-contemplation to maintenance (Prochaska & Marcus, 1994; Prochaska & Velicer, 1997) and had become an important construct in Transtheoretical Model (TTM).

Transtheoretical Model (TTM) of behavioural change is one of the most comprehensive and integrated model that has been used widely to study exercise behaviour. According to Han, Gabriel, and Kohl (2015), the Transtheoretical Model (TTM) suggested that people will begin to perceive more advantages of behaviour changes than disadvantages as they move through later stages. This statement also supported by Prochaska and Velicer (1997), stated that the cons outweigh the pros in the earlier stage, pre-contemplation. However, the pros increase to the same level as the cons in the contemplation or preparation stages, with the pros eventually outweighing cons in the action and maintenance stages. During action and maintenance, the cons decrease, as the new behaviour becomes part of one’s lifestyle. Persons in action and maintenance have a decisional balance favouring the positive features (pros), persons in the pre-contemplation have a balance reflecting reasons not to change (cons), and persons in the contemplation tend to fall between those in precontemplation and action (Marcus, Rakowski, & Rossi, 1992). Within this context, decisional balance scale was used to determine strategies used by university students in perceiving pros and cons of exercise adoption to enhance their physical activity levels (Karaca, Caglar, Deliceoglu, & Bilgili, 2016). Students are suitable to be recruited for study because previous research demonstrates that they differ from the college pass-outs in terms of psychological and environmental factors associated with exercise adoption and maintenance (Calfas, Sallis, Lovato, & Campbell, 1994).

Many previous studies had conducted to examine exercise behaviour using Transtheoretical model. However, there is still limited study to test TTM model on Malaysian population, not to mention validate the five core components in TTM. Therefore, this study aimed to determine the validity and reliability of decisional balance scale for exercise among undergraduate’s students in USM using Confirmatory Factor Analysis (CFA).
METHOD

Participants: Three hundred undergraduate students from different gender (62 males and 238 females) aged between 18-34 years old (Mean= 19.91, SD= 1.420) volunteered to participate in this study. The majority students were from the School of Health Sciences (66.3%) and had undertaken exercise session approximately three sessions (Mean= 2.74) per week and average per session was 43 minutes. By using purposive sampling method, undergraduate students who took part in co-curriculum in 1st October 2017 were recruited.

Measure: The decisional Balance scale is a self-administered 10-items questionnaire which was originally developed by Plotnikoff, Blanchard, Hotz, and Rhodes (2001) were distributed to collect information from eligible students at a single point in time. By using the 5-point Likert scale, students were required to answer based on their preference from “not at all confident” to “extremely confident”. Two main components of the decisional balance scale are pros and cons, which represent the positive and negative aspect of individual’s behavioural changes. The internal consistency reliabilities were reported as 0.82 for pros and 0.72 for cons (Plotnikoff et al., 2001).

Procedure: The data collection took approximately two weeks. Students who attended the co-curriculum were briefed about the study and objective of the survey. Students were informed that their participation is voluntary and they can refuse or be free to withdraw from the study at any time without any loss of benefits to which they entitled or affect their behavioural changes. A questionnaire and research information sheet were distributed to each participant who volunteers to take part in the study. The participants completed the questionnaire and returned it to the researcher during their co-curriculum session. Students from different co-curriculum groups were approached by the researcher in order to have different type of co-curriculum students (i.e., sport, art, uniform) completing the questionnaire. Participants took approximately 10 minutes to complete the questionnaire. The present study is approved by the Research Ethics Committee Universiti Sains Malaysia (USM/JEPEM/17070322).

Analysis: Statistical analysis was conducted using Mplus 8. Data were expressed as the mean and standard deviation (SD) for the numerical variable, whereas categorical variable was tabulated using frequency and percentage for descriptive information. Confirmatory Factor Analysis (CFA) was used in statistical analysis. The CFA models were assessed based on several fit indices: the comparative fit index (CFI) and Tucker and Lewis index (TLI) with the desired value of more than 0.95, the root mean square error of approximation (RMSEA) with the desired value of less than 0.06 and Close fit (Clfit) more than 0.05, and the standardised root mean square (SRMR) with the desired value of less than 0.08 (Kline, 2011).

RESULTS

The participants’ characteristics are shown in Table 1.

| Table 1 Sample Characteristics of Undergraduate Students in USM (n=300) |
|--------------------------|-----------------|-----------------|
| Characteristics          | Mean (SD)       | Frequency (%)   |
| Age                      | 19.91 (1.42)    |                 |
| Gender                   |                 |                 |
| Male                     | 62 (20.7)       |                 |
| Female                   | 238 (79.3)      |                 |
| Ethnicity                |                 |                 |
| Malay                    | 202 (67.3)      |                 |
The measurement model of decisional balance in Model-1, the data does not fit the model (Model-1). Modification was made by correlating residual for item DB 2 with DB1 and DB7 with DB6 when the value of standardised item loading was above 0.5. From the results, the Model-3 displayed good fit of the model based on several indices: CFI= 0.981, TLI= 0.973, SRMR=0.054, RMSEA= 0.042 (90% CI= 0.013, 0.064), RMSEA p-value=0.705 (Table 2).

Table 2 Model Fit Indices for Measurement Model of Decisional Balance

<table>
<thead>
<tr>
<th>Model</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>RMSEA (90% CI)</th>
<th>RMSEA p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model-1</td>
<td>0.883</td>
<td>0.846</td>
<td>0.065</td>
<td>0.100 (0.083, 0.118)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Model-2 (Correlated residual for item DB2 with DB1)</td>
<td>0.934</td>
<td>0.910</td>
<td>0.060</td>
<td>0.087 (0.069, 0.106)</td>
<td>0.001</td>
</tr>
<tr>
<td>Model-3 (Correlated residual for item DB2 with DB1 and DB7 with DB6)</td>
<td>0.981</td>
<td>0.973</td>
<td>0.054</td>
<td>0.042 (0.013, 0.064)</td>
<td>0.705</td>
</tr>
</tbody>
</table>

Figure 1 shows standardised item loading for the measurement model of decisional balance in model-3. The standardised factor loadings for measurement model of decisional balance were above the acceptable value (0.40) ranged from 0.438 to 0.892. DeVon et al. (2007) suggested that factor loading for each item considered satisfied when the value was higher than 0.4. Composite reliabilities were calculated for the pros and cons factors. Both factors reported good construct reliability with 0.79 (95%CI: 0.74-0.83) for Pros and 0.83 (95%CI: 0.80-0.87) for Cons. Based on Nunnally and Bernstein (1994) criterion for the psychological domain, reliability of 0.7 was acceptable.
DISCUSSION

This study aimed to determine the validity and reliability of the decisional balance scale for exercise among the undergraduate students in USM using confirmatory approach. The results revealed convincing evidence towards validity and reliability of the decisional balance scales for undergraduate students. The two-factor model, pros and cons fit the data well and provide solid support for the factorial validity of the scale.

Similar studies were conducted in Korea by Kim (2007) and Plotnikoff et al. (2001) which tested on the decisional balance scale. 10-items questionnaire and 2 factors were used as the study tool for assessing the decision balance to exercise behaviour of Korean students. Test-retest reliability showed a reliability of 0.91 for pros and 0.89 for cons. Studied by Plotnikoff et al. (2001) revealed acceptable fit indices, standardised factor loading and composite reliabilities.

A short and simple yet easy understood questionnaire generates student’s interest to participate in this study, especially first year students who just being exposed to new study environment. In the health campus, which consisting of many future health care providers, they were more alert towards the importance of having a healthy lifestyle by participating in an exercise. In addition, excellent quality and convenient sports facilities by the university was a crucial factor contributing to student’s intention to participate in exercise. With well-equipped sport facilities under acceptable renter price and sufficient sport program organised by the university, students were more positive towards exercise. Throughout this study, it is proved that university students were physically active in exercise with at least 30 minutes per session. This statement was supported by El-Gilany, Badawi, El-Khawaga, and Awadalla (2011) and Njororai and Njororai (2015) found that most of the university students are moderately or vigorously active. Although this study did not show the type of physical activity participation by the university students, it was still within the recommended level stated by Garber et al. (2011).

Studied had demonstrated that the decisional balance scale portrait a good fit indices and factor loading to test among undergraduate students. This indicated that students were able
to make own judgement to participate in exercise and have good behaviour towards exercise. The possible explanation contributing the good result was student's behaviour towards exercise was positive and pleased. By increasing the perceived pros, this study has proved students realised the importance and benefits of exercise. Hence, they are more likely to participate in exercise. With having positive thought on exercise, students could easily overcome the obstacle. An individual would make changes in behaviour when they realised the pros outweigh cons. This could be applied in the theory of Transtheoretical Model (TTM) where pros and cons towards exercise behaviour will move cyclically through stages of change with the period of progression and relapse. Positive aspect and negative aspect were important for influencing persons in the early stage in TTM model, the pre-contemplation to preparation (Velicer, Prochaska, Fava, Norman, & Redding, 1998). The pros and cons of exercise will develop over time over the stages of changes (pre-contemplation, contemplation, preparation, action, and termination).

Pros and cons were linked well to changing behaviour and self-efficacy. This could be explained by the student would act based on own judgement after cognitively evaluate the good and bad aspect of the new behavioural. By having good behaviour in exercise indicated increasing in student's self-efficacy, thus the amount of physical activity also increases (Abbaspour et al., 2017). This is because self-efficacy could help in boosting individual's confidence level, especially when encountering in a dangerous situation.

CONCLUSION

From the result of this study, the data consisting of mixture of students which represent each subscale within 5-point Likert scale. Hence, the variability of data was achieved in the study. Thus, decisional balance scale was considered valid and reliable to test on undergraduate students. In future, we recommend further investigation into the different population in Malaysia using decisional balance scale, for example, students from different university and public.

REFERENCES


Confirmatory Factor Analysis of Processes of Change Scale Among Undergraduate Students in Health Campus, Universiti Sains Malaysia (USM)

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Abstract

Processes of change are techniques and strategies that people use as they progress through different stages of change over time. It is linked with the stages of the changes, to understand how people change a behaviour. The 10 processes of change are divided into two higher factors which were cognitive/experiential and behavioural. Purpose: The aim of this study was to determine the validity and reliability of processes of change scale for exercise among undergraduate’s students in USM using the Confirmatory Factor Analysis. Method: A cross-sectional study was carried out to test among USM undergraduate students who took part in the co-curriculum. By using purposive sampling, students were informed that their participation is entirely voluntarily to fill in self-administered 30-items questionnaire using 5-point Likert scale before the co-curriculum session. The questionnaire was collected after the co-curriculum session ended. Data were analysed using Mplus version 8 software. Results: A total of 300 students participated in this study. Majority of the students were female (79.3%), and were Malay (67.3%) with the mean of 2.74 times exercise per week, and mean of 43.37 minutes exercise per session. For measurement model assessment, processes of change scale showed a good fit index: RMSEA= 0.041 (90% CI= 0.034- 0.048), CFI= 0.946, TLI= 0.935, SRMR=0.052. Composite reliability showed a good construct reliability for cognitive processes ranged from 0.6 to 0.8 and behavioural processes ranged from 0.8 to 0.9. Conclusion: The findings suggest that processes of change scale is valid and reliable to test Malaysian undergraduate students.

Keywords: Confirmatory Factor Analysis, processes of change scale, Transtheoretical Model, reliability, validity, students

INTRODUCTION

Participation in regular physical activity offers several health benefits. It is widely understood that regular physical activity is important in preventing many diseases and medical conditions such as ischemic heart disease, hypertension, obesity, diabetes, breast and colon cancer (Molanorouzi, Khoo, & Morris, 2015). Despite numerous health benefit of regular physical activity, it has been found out majority Malaysian do not adequately participate in physical activity (Poh et al., 2010). Thus, many researchers and health
practitioners were facing problem in initiating physical activity among non-active people and to maintain a high level of adherence to physical activity among active person.

A theoretical model, Transtheoretical Model (TTM) was developed by Prochaska and DiClemente (1983) which aimed to understand individual’s behavioural changes. The processes of change which derived from TTM hypothesises that people use experiential (i.e., cognitive-affective) and behavioural (i.e., overt tactics) processes, to modify their experiences and environment in ways to support their attempts to move between progressive stages of change from having intention to subsequent adoption and maintenance of regular physical activity (Prochaska, DiClemente, & Norcross, 1992; Prochaska, Velicer, DiClemente, & Fava, 1988). The stages of change and processes of change (DiClemente et al., 1991; Prochaska & DiClemente, 1983) has been used to understand how people change a problem behaviour. The model describes individual engaging in a new behaviour move through a series of change: precontemplation, contemplation, preparation, action, and maintenance. The processes of change are techniques and strategies that people use as they progress through different stages of change over time (Prochaska & DiClemente, 1983). The ten processes of change are divided into two higher factors which were cognitive/experiential and behavioural. Cognitive processes obtain information by an individual’s actions (Kim, 2007). Examples of cognitive processes are consciousness raising, dramatic relief, self-re-evaluation, environmental re-evaluation, and social liberation (Bernard et al., 2014). In behavioural processes, mostly obtains information from environmental events (Kim, 2007). Examples of behavioural processes are self-liberation, counter-conditioning, stimulus control, reinforcement management, and helping relationships (Bernard et al., 2014).

Individual’s behaviour may change according to different stages of change. Prochaska and DiClemente (1983) indicating that self-changers are using the fewest processes of change during precontemplation and emphasise consciousness raising at contemplation. They emphasised self-re-evaluation in contemplation and action stage, and reported increased usage of self-liberation, helping relationships, plus reinforcement management in the action and maintenance stage. Velicer, Prochaska, Fava, Norman, and Redding (1998) mentioned that the cognitive processes are mostly used in the early stages and the behavioural processes in the later stages of change. In the exercise domain, cognitive processes have been found to peak in the contemplation stage and behavioural processes have been shown to steadily increase from precontemplation to action, at which point they level off (Marcus, Pinto, Simkin, Audrain, & Taylor, 1994b; Nigg & Courneya, 1998).

In contrary, Dishman, Jackson, and Bray (2010) reported that many peoples appeared to use both cognitive and behavioural processes while they attempt to increase or maintain their physical activity. In general, the cognitive processes are used more frequently by those in the early stages, whereas people in later stages rely more on the behavioural processes (Marcus & Forsyth, 2009). Many previous studies had conducted to examine exercise behaviour using Transtheoretical model. However, there is still limited study to test the process of change on Malaysian population, not to mention validating it among university’s students. Therefore, this study aimed to determine the validity and reliability of processes of change scale for exercise among undergraduate’s students in USM using Confirmatory Factor Analysis (CFA).

**METHOD**

**Participants:** Three hundred undergraduate students (62 males and 238 females), aged between 18-34 years old (Mean= 19.91, SD= 1.420) volunteered to participate in this study. The majority students were from the School of Health Sciences (66.3%) and had
undertaken exercise session approximately three sessions (Mean= 2.74) per week and average per session was 43 minutes. By using purposive sampling method, any undergraduate students who took part in co-curriculum in 1st October 2017 were recruited.

**Measure:** The processes of change scale is a self-administered 30-items questionnaire which was originally developed by Nigg, Norman, Rossi, and Benisovich (1999) were distributed to collect information from eligible students at a single point in time. By using the 5-point Likert scale, students were required to answer based on their preference from “never” to “repeatedly”. Ten main components of the processes of change scale are consciousness raising, dramatic relief, environmental re-evaluation, self-evaluation, social liberation, counter conditioning, helping relationship, reinforcement management, self-liberation, and stimulus control. The internal consistency reliabilities were reported as 0.6 to 0.9 for two higher factors (Nigg et al., 1999).

**Procedure:** The data collection took approximately two weeks. Students who attended the co-curriculum were briefed about the study and objective of the survey. They were informed that their participation is voluntary and they can refuse or are free to withdraw from the study at any time without any loss of benefits to which they entitled. A questionnaire and research information sheet were distributed to each participant who volunteered to take part in the study. The participants completed the questionnaire and returned it to the researcher during their co-curriculum session ended. The researcher approached the students from different co-curriculum groups to get the different type of co-curriculum students (i.e., sport, art, uniform) completing the questionnaire. Participants took approximately 10 minutes to complete the questionnaire. The present study is approved by the Research Ethics Committee Universiti Sains Malaysia (USM/JEPeM/17070322).

**Analysis:** Statistical analysis was conducted using Mplus 8. Data were expressed as the mean and standard deviation (SD) for the numerical variable, whereas categorical variable was tabulated using frequency and percentage for descriptive information. Confirmatory Factor Analysis (CFA) was used in statistical analysis. The CFA models were assessed based on several fit indices: the comparative fit index (CFI) and Tucker and Lewis index (TLI) with the desired value of more than 0.92, the root mean square error of approximation (RMSEA) with the desired value of less than 0.07 and the standardised root mean square (SRMR) with the desired value of equal or less than 0.08 (Hair, Black, Babin, & Anderson, 2010).

**RESULTS**

The participants’ characteristics are shown in Table 1.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mean (SD)</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>19.91 (1.42)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>62 (20.7)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>238 (79.3)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malay</td>
<td>202 (67.3)</td>
<td></td>
</tr>
<tr>
<td>Chinese</td>
<td>63 (21.0)</td>
<td></td>
</tr>
<tr>
<td>Indian</td>
<td>19 (6.3)</td>
<td></td>
</tr>
<tr>
<td>Other races</td>
<td>19 (6.3)</td>
<td></td>
</tr>
<tr>
<td>Field of study</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
School of Medical Sciences 64 (21.3)
School of Dental Sciences 37 (12.3)
School of Health Sciences 199 (66.3)

Years of study 1.45 (0.82)
Exercise frequency (per week) 2.74 (2.51)
Exercise period per session 43.37 (49.93)

The measurement model of processes of change fit well based on several indices: CFI= 0.946, TLI= 0.935, SRMR=0.052, RMSEA= 0.041 (90% CI= 0.034- 0.048), RMSEA p-value=0.984 (Table 2). All fit indices were under acceptable range.

Table 2 Model Fit Indices for Measurement Model of Processes of Change

<table>
<thead>
<tr>
<th>Model</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>RMSEA (90% CI)</th>
<th>RMSEA p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model-1</td>
<td>0.946</td>
<td>0.935</td>
<td>0.052</td>
<td>0.041 (90% CI= 0.034- 0.048)</td>
<td>0.984</td>
</tr>
</tbody>
</table>

Figure 1 shows the standardised item loading for the measurement model of processes of change. The standardised factor loadings for measurement model of processes of change were above the acceptable value (0.50) ranged from 0.453 to 0.895. According to Hair et al. (2010), a good standardised loading factor of each measurement latent variable of which quantified from manifest variable should be above 0.5 and ideally 0.7 or higher. Thus, the initial model was considered as the final measurement model. Composite reliabilities were calculated for ten processes of change and ranged from 0.6 to 0.8 for cognitive processes and 0.8 to 0.9 for behavioural processes. Based on Tseng, Dornyei, and Schmitt (2006), the minimum acceptable range of composite reliability is 0.6 and above.
This study aimed to determine the validity and reliability of the processes of change scale for exercise among the undergraduate students in USM using confirmatory approach. The results revealed convincing evidence towards validity and reliability of the processes of change scales for undergraduate students. The ten-factor model, consciousness raising,
dramatic relief, self-re-evaluation, environmental re-evaluation, and social self-liberation, counter-conditioning, stimulus control, reinforcement management, and helping relationships fit the data well and provide solid support for the factorial validity of the scale.

A short and simple yet easy understood questionnaire generates student’s interest to participate in this study, especially the first-year students who just being exposed to new study environment. In the health campus, which consisting of many future health care providers, they were more alert towards the importance of having a healthy lifestyle by participating in an exercise. In addition, excellent quality and convenient sports facilities by the university was a crucial factor contributing to student’s intention to participate in exercise. With well-equipped sport facilities under acceptable renter price and sufficient sport program organised by the university, students were more positive towards exercise. Throughout this study, it is proved that university students were physically active in exercise with at least 30 minutes per session. This statement was supported by El-Gilany, Badawi, El-Khawaga, and Awadalla (2011) and Njororai and Njororai (2015) found that most of the university students are moderately or vigorously active. Although this study did not show the type of physical activity participation by the university students, it was still within the recommended level stated by Garber et al. (2011).

The final model of this scale had good fit indices based on Hair et al. (2010), which suggested different model situations will have different fit indices depending on the sample size and the number of observed variables. This guideline was contradicted with Kline (2011) which introduce one guideline regardless of the difference in model situations. However, both guidelines are commonly used in the validation study.

The present study indicated all items and factors were remain in the model. This is similar with studies conducted by Nigg et al. (1999), Kim (2002), Lee, Park, and Kim (2006) and Astroth, Fish, Mitchell, Bachman, and Hsueh (2010) which tested on the processes of change scale had reported good internal consistency. 30-items questionnaire and 10 factors were used as the study tool for assessing the behavioural and cognitive activities that students used to modify their intentions and behaviour in exercise. Studied by Nigg et al. (1999) reported Cronbach’s alpha values ranged from 0.62 to 0.85, whereas studied by Kim (2002) reported the Cronbach’s alpha values ranged from 0.80 to 0.93. Another study by Lee et al. (2006) who tested on Korean’s women had reported the Cronbach’s alpha values ranged from 0.76 to 0.89. It has also shown to be a useful measure in processes of change scale by Astroth et al. (2010), Cronbach alpha’s of behavioural process of change are 0.82 and 0.85 for experiential processes of change. Processes of change scale often derived from TTM. As part of TTM’s goal which used to explain how health behaviour change occurs, 10 processes of change were important in identifying the strategies and techniques that people use to change their behaviour (Prochaska, Velicer, DiClemente, & Fava, 1988).

CONCLUSION

From the result of this study, the data consisting of a mixture of students which represent each subscale within 5-point Likert scale. Hence, the variability of data was achieved in the study. Thus, processes of change scale is considered valid and reliable to test on undergraduate students. In future, we recommend further investigation into the different population in Malaysia using the processes of change scale, for example, students from different university, social status, as well as their health.
REFERENCES


The Effect of Adding Music during Imagery Training for Enhancing the Performance of Kelantan State Tenpin Bowling Players

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Corresponding author: syafiqah02@student.usm.my

Abstract

Numerous studies found music has a strong relationship with athletes’ sporting performance. Thus, this study is conducted to determine the effectiveness of adding music during imagery training in enhancing the performance of Kelantan’s tenpin bowlers. Total of 14 participants with 10 male and 4 female (age: 12.86±1.83) volunteered to participate in this study. The study employed a crossover study design with two research conditions: Imagery training only (IT), and Music and imagery training (MIT). For IT, the participants listened to imagery training audio for 12 sessions and following with 1 week of the resting period. Then, continued with imagery training audio adding with music for the same session. Participants were required to perform pre and post-session of bowling shots before and after imagery training session. Results show that there was a significant difference between pre and post session of bowling shots for both imagery training (p < 0.05) where mean for imagery training with music is slightly higher rather than imagery training without music. Based on the result obtained, it can be concluded that in the present study, by adding music to the imagery training, the participants performed better.

Key words: imagery training, music, bowling tenpin

INTRODUCTION

The objective of playing tenpin bowling is to knock down as many pins as possible as the heavy ball is rolled down on a wooden lane. Meanwhile, imagery is when mental is stimulating an action without having the body to do any movement as it is in dynamic state (1). Historically, music has taken place in most of the sporting performance as the previous research found that there is a strong relationship between music and sporting performance (2). Thus, this study is carried out to see if music can facilitate in the production of the imagery (3). The total of 14 (n=14) Kelantan tenpin bowling players were selected to participate in this study.
Table 1. Frequency years of involvement of the participants (N=14)

<table>
<thead>
<tr>
<th>Years of involvement</th>
<th>Frequencies</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>14.30</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>21.40</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>7.10</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>35.70</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>14.30</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>7.10</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 2. Frequency age of the subjects (N=14)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>1</td>
<td>7.14</td>
</tr>
<tr>
<td>11</td>
<td>2</td>
<td>14.29</td>
</tr>
<tr>
<td>12</td>
<td>3</td>
<td>21.43</td>
</tr>
<tr>
<td>13</td>
<td>2</td>
<td>14.29</td>
</tr>
<tr>
<td>14</td>
<td>4</td>
<td>28.57</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>7.14</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>7.14</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100.00</td>
</tr>
</tbody>
</table>

METHODS

Production of imagery script and recording of imagery audio

Imagery training without music
12 session of imagery training
20 shots of tenpin bowling throw
Pre, mid and post-session

1 week of washout period
No treatment or test is given in order to eliminate previous treatment or test

Imagery training without music
12 session of imagery training
20 shots of tenpin bowling throw
Pre, mid and post-session

Data is analysed using SPSS version 17.0
RESULTS

Table 3. Pre and post session of imagery training without music

<table>
<thead>
<tr>
<th>Imagery training without music</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-session</td>
<td>8.70</td>
<td>1.27</td>
</tr>
<tr>
<td>Post-session</td>
<td>11.13</td>
<td>1.25</td>
</tr>
</tbody>
</table>

Table 4. Pre and post session of imagery training with music

<table>
<thead>
<tr>
<th>Imagery training with music</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-session</td>
<td>9.62</td>
<td>1.29</td>
</tr>
<tr>
<td>Post-session</td>
<td>11.78</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Figure 1. Comparison of pre and post mean of imagery training without music and with music.

DISCUSSION

The objective of this study was to investigate the effectiveness of adding music to imagery training for enhancing the performance of Kelantan tenpin bowling player. The results from this study showed that by using imagery training with music, it is more effective where mean pre and post (Mpre=9.62, Mpost=11.78) showed significant differences. The results were aligned with the previous finding that music has been used to improve psychological state of athletes and facilitate in physical and athletic performance (3). Meanwhile, imagery training without music showed the mean pre and post (Mpre=8.70, Mpost=11.13), where there is also significantly different yet the mean different is slightly lower compared to use imagery training with music. Thus, the results showed that music can be used as a medium to promote imagery compared to imagery alone (4). Thus, we can recommend to coaches to use imagery training with music for enhancing the performance of Kelantan tenpin bowling player.
CONCLUSION

In conclusion, by using both imagery training whether without music or with music, are effective for enhancing the performance of Kelantan tenpin bowling players. Although there is increasing of mean in both imagery training, imagery training with music showed higher mean difference between pre and post compared to imagery training without music. Thus, based on the results of this study, we would encourage the coaches and athletes to add music during imagery training, so that the players could perform better.

REFERENCES

The Effect of Using Virtual Reality Simulation as External Imagery Modelling on Competitive State Anxiety
Nur Haida Che Mat Ariffin, Garry Kuan, Ayu Suzailiana Muhamad
Exercise & Sports Science Programme, School of Health Science, Universiti Sains Malaysia, Malaysia.

Abstract

Mental imagery is a mental technique that programs the mind and body to respond concurrently. However, there were limited studies that utilise virtual reality simulation as external imagery modelling for taekwondo players. By using virtual reality during training, it could help to enhance the athletes' performance by lowering their performance anxiety. The purpose of this study is to investigate the effect of virtual reality simulation as external imagery modelling on somatic and cognitive state anxiety. Competitive State Anxiety Inventory-2 (CSAI-2R) was employed to measure participants' competitive anxiety level. 30 taekwondo athletes participated in this study. They were divided into three research conditions, namely control group (C), mental imagery group (MI) and virtual reality group (VR). The results showed that, virtual reality group (VR) has significantly reduced both somatic (p=0.003) and cognitive (p=0.025) state anxiety based on paired t-test. However, no significant difference found in both C and MI group for both somatic and cognitive state anxiety. Future research directions are suggested.

Key words: imagery training, Virtual reality,

INTRODUCTION

Taekwondo is practised in two forms in which the modern form of taekwondo places importance on sports performance and competition (Heller et al., 1998). Training in taekwondo is systematic, long-term and progressive. It involves mastering the basic skills, learning different forms of sparring and breaking techniques (Pieter & Heijmans, 2003).

Mental imagery is a mental technique that programs the mind and body. Athletes use mental imagery by imagining themselves in a specific environment or, performing a specific action, including enhancing a specific skill, building confidence, thinking positive, controlling anxiety or arousal, analysing performance outcomes, and for preparation before a competition (Amasiatu, 2013; Plessenger, 2009).

Virtual reality (VR) is a useful method used for skill acquisition (Bergamasco et al., 2012). VR has inherent characteristics which are user-specific viewpoints and a wide three-dimensional view. Therefore, it provides a great sense of immersion making it a rich form of media (Segovia & Bailenson, 2009). Use of VR has been found to be effective in various areas such as surgery (Howell et al., 2008), rehabilitation (Holden, 2005) and recently in sport (Bideau et al., 2010).

Cashmore (2002) reported the term anxiety states an unpleasant emotion. Anxiety is stated to occur unexpectedly, and it leads to increase the stress level of athletes (Butt et
al., 2003). It is reported that athletes display weak performance when they lose control of their emotion during competition (Anshel, 1997). Somatic anxiety is characterised by muscle tension, rapid heart rate and nausea and is proposed to have shown a relationship with performance (Chapman et al., 1997). Chamberlain and Hale (2007) in their study “Competitive state anxiety and self-confidence: Intensity and direction as relative predictors of performance on a golf putting task”, show a curvilinear relationship with increasing level of somatic anxiety is related to poorer performance up to a point.

Cognitive anxiety typically caused by negative self-talk and images of failure is proposed to have destructed performance. In general, cognitive anxiety has an adverse effect on athletic performance. Dunn (1999) in his study on ice hockey players found that four elements in cognitive anxiety are fear of failure, worries related to negative social evaluation, worries related to injury or physical danger and uncertain fear related to unknown. The relationship between anxiety and performance in combat sports such as taekwondo and boxing has supported the destructive effect of cognitive anxiety.

The previous study has shown that virtual reality and mental training such as imagery could reduce the anxiety level. However, there were limited studies of virtual reality on taekwondo players on their competitive state anxiety. Taekwondo requires full attention and focus in performing its basic skills especially sparring. Thus, by using virtual reality simulation as external imagery during training, it could help by enhancing the athlete self-confidence and lower their performance anxiety. Thus, this study attempted to investigate the effect of using virtual reality simulation as external imagery modelling on somatic and cognitive state anxiety.

METHODS

Research Design. This study employed pre-test, intervention and post-test study design. Twelve sessions of imagery with virtual reality were conducted over one month period at Sekolah Menengah Agama Tengku Amalin. An adherence logbook was used to monitor the participants day, time, and duration of each intervention session after they had completed each intervention session.

Participants. A total of 36 female taekwondo athletes from Sekolah Menengah Agama Tengku Amalin participated in this study. The inclusion criteria include age between 13 to 17 years old, healthy, currently not participate in a structured mental training programme and have at least one year of experience in taekwondo. The sample size was calculated using G-Power 3.1. With the significance level of 0.05 was set to achieve moderate effect size of 0.50 (Kuan, Morris, & Terry, 2012). Power of the study was set at 0.80. The calculated sample size was 10 participants in each group. With 20% of dropout rate, additional 2 participants were recruited, making 12 participants allocated to each group. Hence, a total of 36 participants were recruited and randomly allocated to each group.

Measures

Competitive State Anxiety Inventory 2 (CSAI-2R). CSAI-2R (Cox et al., 2003) is a 17-item scale that measures cognitive state anxiety (5 items), somatic state anxiety (7 items) and self-confidence (5 items) in a competitive setting. The main reason for modifying the CSAI-2 was to produce a more psychometrically sound measure. Respondents rate their feelings before the competition on the 17-item instrument (e.g., I feel jittery, I am concerned about losing) using a 4-point Likert scale from 1 (not at all), through 2 (somewhat), and 3 (moderately so), to 4 (very much so). Subscale scores are calculated by summing items in each subscale, dividing by the number of items, and multiplying by 10. The score range is
10 – 40 for each subscale. Higher scores indicate higher intensities of cognitive and somatic state anxiety, as well as higher levels of self-confidence. The factorial validity of the CSAI-2R was previously established by Cox et al. (2003), using confirmatory factor analysis (CFA) on data from 331 athletes, which showed a good fit of the hypothesised measurement model to the data (CFI = .95, NNFI = .94, RMSEA = .05) and Cronbach alpha coefficients for each subscale of the CSAI-2R showed sound internal consistency (somatic anxiety = .88, cognitive anxiety = .83, self-confidence = .85).

**Imagery adherence logbook.** After the end of each intervention session, the participant fill-up response in the log-book provided. The details include date, time, feeling after each end of each session. Participants filled in their experiences after each imagery session.

**Study Procedures.** This study received ethical approval was obtained from the Human Research Ethics Committee of Universiti Sains Malaysia and followed recommendations by the Declaration of Helsinki and guidelines of Good Clinical Practices (GCP). The consent form and demographic form were provided to the participants who volunteered to participate in this study. During pre and post-test, participants were requested to complete the CSAI-2R questionnaires. Then, participants were divided into three intervention groups: Control group (C, n=12), Mental imagery group (MI, n=12), and Virtual reality group (VR, n=12). The intervention was carried out as much as three sessions per week for one month (total of 12 sessions). Participants in the C group follow training provided by the coach. In addition to the training provided by the coach, participants in the MI group were trained by listening to the voice on hand-phone on how to do each skill while the participants in the VR group were trained by using a virtual reality device. After completing the 12 intervention sessions, the participants performed post-test which was similar to the pre-test. Finally, data analysis was performed by using SPSS version 22.

**Results**

It was found that there was a significant difference in VR research condition. The somatic state anxiety was found to have significantly reduced (p=0.003) after the intervention. However, there no significant difference found in C and MI. The cognitive state anxiety also found to have significantly reduced (P=0.025) after the intervention. However, there no significant difference found in C and MI.

<table>
<thead>
<tr>
<th>Research condition (Somatic State Anxiety)</th>
<th>Control (C)</th>
<th>Mental Imagery (MI)</th>
<th>Virtual Reality (VR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test Measurement 1 p value*</td>
<td>24.60</td>
<td>6.10</td>
<td>25.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>25.00</td>
</tr>
<tr>
<td>Post-test Measurement 1 p value*</td>
<td>20.80</td>
<td>5.25</td>
<td>17.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>22.10</td>
</tr>
<tr>
<td>Pre-test Measurement 2 p value*</td>
<td>23.30</td>
<td>4.97</td>
<td>22.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>19.20</td>
</tr>
<tr>
<td>Post-test Measurement 2 p value*</td>
<td>21.10</td>
<td>6.84</td>
<td>22.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>14.70</td>
</tr>
<tr>
<td>Paired sample t-test (Comparison between measurement 1 pre-test and measurement 2 post-test)</td>
<td>0.316</td>
<td>0.433</td>
<td><strong>0.003</strong></td>
</tr>
<tr>
<td>Research condition (Cognitive State Anxiety)</td>
<td>Control (C)</td>
<td>Mental Imagery (MI)</td>
<td>Virtual Reality (VR)</td>
</tr>
<tr>
<td>---------------------------------------------</td>
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<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
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<tr>
<td>Pre-test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement 1</td>
<td>24.40</td>
<td>6.59</td>
<td>24.80</td>
</tr>
<tr>
<td>p value*</td>
<td>0.992</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement 2</td>
<td>23.20</td>
<td>5.51</td>
<td>22.30</td>
</tr>
<tr>
<td>p value*</td>
<td>0.792</td>
<td></td>
<td></td>
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<tr>
<td>Post-test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement 1</td>
<td>22.80</td>
<td>5.10</td>
<td>22.20</td>
</tr>
<tr>
<td>p value*</td>
<td>0.907</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement 2</td>
<td>21.00</td>
<td>3.92</td>
<td>20.80</td>
</tr>
<tr>
<td>p value*</td>
<td>0.145</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paired sample t-test (Comparison between measurement 1 pre-test and measurement 2 post-test)</td>
<td>0.079</td>
<td>0.066</td>
<td><strong>0.025</strong></td>
</tr>
</tbody>
</table>

**DISCUSSION**

Based on the result from this study, VR was found to have a reduction in somatic state anxiety compared to C and MI. Similarly, Barr & Hall (1992) found that imagery can be used to control anxiety. Van Den Berg and Smith (1993) also hypothesised that imagery training is an effective tool in reducing anxiety in high school wrestlers. Besides, VR also found to have significantly reduced in cognitive state anxiety. Vadocz et al. (1997) found that athletes who had previously experienced success were less worried about the upcoming competition than to those with less experience. Chapman et al. (1990) found that winning performer of Taekwondo competition has lower cognitive and somatic state anxiety than the losers.

**CONCLUSION**

This study examined the effect of using virtual reality simulation as external imagery on the somatic and cognitive state anxiety using the CSAI-2R. This study showed that there is a significant difference in both somatic and cognitive state anxiety between before and after the intervention. Imagery is a popular mental training that is well-utilised by athletes of all levels to enhance sports performance including refining skills, strategies planning, regulating emotions, increase arousal, managing cognition, and as a motivational drive (Cumming & Ramsey, 2009; Murphy et al., 2008). Based on the current study, it was found that virtual reality significantly decreased somatic state anxiety and cognitive state anxiety among participants. Further research might explore the variety of imagery script used in virtual reality device so that the participants will keep having their full interest in the study.

**REFERENCES**


Abstract

The use of music in exercise and sports science has become the main interest in the field of psychology. In general, some people prefer running while listening to random music without considering the degree of synchronicity between the music and their body movement. The purpose of this study is to examine the ergogenic effects of using synchronous and asynchronous music on mood states in running. The participants were all active males performed shuttle run test protocol under three different conditions: without music, and running with music (synchronous and asynchronous). The results showed that participants reported higher positive mood (vigour) when running without music, the feeling of tension (negative mood) was significantly lower in asynchronous music than running with synchronous music, meanwhile the state of fatigue showed significantly much lower in asynchronised music than running with synchronised music. In conclusion, music can influence the mood states in running.

Keywords: active male, synchronous and asynchronous music, running, mood states

INTRODUCTION

Several ergogenic aids such as nutritional, pharmacological, biomechanical, physiological and psychological aids have been introduced and used by athletes in which could potentially help those athletes perform at their best in their respective sports (Bigliassi et al., 2012). The influence of music on human behaviour nowadays has become a kind of interesting topic to the various fields of psychology. However, studies on the effectiveness of music and the interpretation of human behaviour have been difficult because this type of research dealt with emotions, mood state and feelings of individuals, which are more subjective, and typically challenging to measure scientifically. Despite the challenges, a few past researchers concluded that music could elevate mood states and improve emotions while performing tasks.

Music has been recently used and studied in sports and exercise fields. The rhythm and the tempo of music itself play a significant role in enhancing sports performance (Priest & Karageorghis, 2008). According to Karageorghi and colleagues (2010), music can influence exercise in many different conditions such as shifting in psychomotor arousal levels, narrowing one’s attention, resulting in a decreased fatigue sensation and promotes mood changes. To some extent, music is not only becoming an effective emotion regulation, but it is also beneficial to enhance sports and exercise performance (Lane, Davis & Devonport, 2011). On the other hand, Bigliassi et al. (2012) reported that there is no
significant difference in psychophysiological parameters during a 5 km time-trial among ten trained cyclists and concluded that music intervention (before or during exercise) did not influence cycling performance.

Running is one of the most common exercise, practiced by both athletes and sedentary people. Since it is a repetitive type of exercise, athletes’ attention usually tends to be shifted towards exercise-induced feelings of fatigue during running which will result in increased of fatigue sensation and thus decreased time-to-exhaustion and eventually the athletes’ performance would drop. Listening to music while performing sport activities is believed to distract from fatigue and feeling of discomforts (Yamashita et al., 2006), alter mood states and increase arousal (Lim et al., 2014). Synchronous music was based on highly rated music containing synchronous elements; meanwhile, the asynchronous music is the absence of synchronous elements in the conscious state that did not tally with one’s running cadence or pattern of movement (Karageorghis et al., 2010).

A study conducted by Terry and colleagues (2012), found positive effects of using synchronous music in metabolic and mood responses during submaximal and exhaustive treadmill running among a group of triathletes. In general, even though music enhances both aerobic and anaerobic exercises, the use of synchronous, asynchronous and dexterous music tend to benefit more on aerobic type of exercise rather than anaerobic exercise such as in swimming and running. Running is also one of the most common exercise, practiced by both athletes and sedentary people. Commonly, some people prefer running while listening to random music without considering the degree of synchronicity between the music and their body movement. Therefore, this study aims to find out the effects of using synchronous and asynchronous music on active male runners’ mood states.

**METHODS**

**Research design**

This study employed a randomised experimental study design to examine whether synchronous and asynchronous music provide ergogenic effects on mood states among the active male runners. The study was conducted over a three-week period from May until early of June 2017. Participants were given one week of recovery period between the second and third sessions.

**Participants recruitment**

Fifteen active male participants were recruited from the Health Campus, Universiti Sains Malaysia, Kubang Kerian, Kelantan via poster advertisement. Their age ranged from 19-26 years old. All participants were actively participating in weekly running session of at least three times per week and able to run a minimum of level seven of the 20-m shuttle run test as the inclusion criteria. For the exclusion criteria, they are not physically active, unable to complete level seven from the shuttle run test, engaged in other research project and taking any medications or drugs during the test period. Physical Activities Readiness Questionnaires (PAR-Q), informed consent and participant demographic sheet together with inclusion and exclusion criteria were distributed to the participants prior to the study. Participants also were informed that they were free to withdraw from the study anytime and signed consent if they wish to volunteer. All participants were randomised into three music conditions, which were running with no music, running with synchronous and asynchronous music. All participants started the 20-m shuttle run with music at level four onward. Mood states were recorded pre- and post-running using Brunel Mood Scale (BRUMS) and rated the music using Brunel Music Rating Inventory-3 (BMRI-3).
**Results.** Participants reported higher state of vigour when running without the presence of music compared to running with both synchronous and asynchronous music. The feeling of tension was significantly lower in asynchronous music than running with synchronous music, meanwhile the state of fatigue showed significantly much lower in asynchronised music than running with synchronised music (see Table 1).

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Pre-running mood</th>
<th>Post-running mood</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
</tr>
<tr>
<td></td>
<td>No music</td>
<td>Sync music</td>
</tr>
<tr>
<td>Anger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I7</td>
<td>.40 ± .83</td>
<td>.47 ± .92</td>
</tr>
<tr>
<td>I11</td>
<td>.20 ± .41</td>
<td>.27 ± 1.03</td>
</tr>
<tr>
<td>I19</td>
<td>.20 ± .78</td>
<td>.33 ± .82</td>
</tr>
<tr>
<td>I22</td>
<td>.13 ± .35</td>
<td>.20 ± .78</td>
</tr>
<tr>
<td>Confusion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I3</td>
<td>.47 ± .99</td>
<td>.40 ± .83</td>
</tr>
<tr>
<td>I9</td>
<td>.80 ± .86</td>
<td>.53 ± 1.13</td>
</tr>
<tr>
<td>I17</td>
<td>.53 ± .99</td>
<td>.33 ± .62</td>
</tr>
<tr>
<td>I24</td>
<td>.73 ± 1.10</td>
<td>.47 ± .83</td>
</tr>
<tr>
<td>Depression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I5</td>
<td>.67 ± .98</td>
<td>.87 ± 1.41</td>
</tr>
<tr>
<td>I6</td>
<td>1.47 ± 1.19</td>
<td>1.20 ± 1.42</td>
</tr>
<tr>
<td>I12</td>
<td>.40 ± .83</td>
<td>.27 ± .59</td>
</tr>
<tr>
<td>I16</td>
<td>.27 ± .80</td>
<td>.27 ± .46</td>
</tr>
<tr>
<td>Fatigue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I4</td>
<td>1.33 ± 1.35</td>
<td>.87 ± 1.25</td>
</tr>
<tr>
<td>I8</td>
<td>.87 ± 1.13</td>
<td>.67 ± 1.18</td>
</tr>
<tr>
<td>I10</td>
<td>1.53 ± 1.55</td>
<td>1.07 ± 1.16</td>
</tr>
<tr>
<td>I21</td>
<td>1.33 ± 1.11</td>
<td>.73 ± .88</td>
</tr>
<tr>
<td>Tension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I1</td>
<td>.33 ± .62</td>
<td>.47 ± .64</td>
</tr>
<tr>
<td>I13</td>
<td>.20 ± .41</td>
<td>.40 ± .51</td>
</tr>
<tr>
<td>I14</td>
<td>.47 ± .92</td>
<td>.53 ± .83</td>
</tr>
<tr>
<td>I18</td>
<td>.73 ± 1.10</td>
<td>.40 ± .63</td>
</tr>
<tr>
<td>Vigour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I2</td>
<td>1.93 ± 1.03</td>
<td>1.47 ± .99</td>
</tr>
<tr>
<td>I15</td>
<td>1.53 ± .99</td>
<td>1.47 ± .99</td>
</tr>
<tr>
<td>I20</td>
<td>1.73 ± 1.22</td>
<td>1.27 ± 1.16</td>
</tr>
<tr>
<td>I23</td>
<td>1.67 ± 1.23</td>
<td>1.53 ± .92</td>
</tr>
</tbody>
</table>

Abbreviations: Sync, Synchronous music; Async, Asynchronous music; I, Item
DISCUSSION and CONCLUSION

Based on the results, the feeling of vigour was positively reported highest during running with the absence of music compared to music conditions. Most of the participants were quite active in running and other sports. Hence, there may be a likelihood that the participants have been conditioned to external stimuli such as auditory responses from crowds or spectators and they were able to divert their attention away from the stimuli every time they compete. According to Brownley et al. (1995), trained athletes directed their attention toward internal cues instead of external stimuli (music) during exercise, which means, they are trained to respond to external stimuli that may distract their focus during real competition and they are used to it. Nevertheless, many findings from previous studies reported that music that synched with running pace elicits a higher positive mood, excitement and physical energy than asynchronous music (see Bonnette et al., 2012).

In this study, although the fatigue mood has increased after running, it was found that listening to asynchronous music has the least score in fatigue mood score among all conditions in post-running. The participants became increasingly exhausted towards higher levels of shuttle run which means the energy level has depleted and the participants began to decrease the momentum of their running. Lopes-Silva and colleagues (2015) investigated the effects of music on time-to-exhaustion as well as the psychophysiological responses between fatigued and non-fatigued conditions. Regardless of the fatigue status, they hypothesised that music had a pronounced effect on associative thoughts, reducing attentional focus and distract the sensations of pain caused by exercise. Listening to asynchronous music may narrow down the attention and distract the individual from the exercise-induced feelings of fatigue. Furthermore, listening to asynchronous music can reduce muscle tension and promotes efficient blood flow after exercise (Szmedra & Bacharach, 1998).

The present results showed that tension mood was significantly reduced in post-running after listening to asynchronous music compared to synchronous and no music conditions.

REFERENCES


Effects of Synchronous Music on Rating Perceived Exertion and Running Performance in Hot and Humid Conditions
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Universiti Sains Malaysia, Malaysia.

Abstract

Running in high heat and humidity increases psychophysiological strain, which typically impairs running performance, whereas listening to synchronous music has been shown to provide psychophysiological benefits, which may enhance running performance. The present randomized crossover study examined effects of listening to synchronous music on psychophysiological parameters and running performance in hot and humid conditions. Twelve male runners (21.7 ± 2.2 y; 166.17 ± 7.18 cm; 60.32 ± 9.52 kg; 59.29 ± 5.95 ml.kg⁻¹.min⁻¹) completed two running trials in simulated conditions (31°C and 70% humidity) with and without synchronous music. Participants ran on a treadmill inside a heat chamber for 60 min at 60% VO₂max and continued to run to exhaustion at 80% VO₂max. Time-to-exhaustion under the synchronous music condition was 66.59% longer (mean = 376.5s vs 226.0s, \( p < .05, d = 0.63 \)) compared to the no music condition. RPE was significantly lower for the synchronous music condition at each time point (15, 30, 45, 60 min) of the steady state portion of the running trials. Findings suggest that listening to synchronous music is beneficial to running performance and perceived exertion in hot and humid conditions.

Keywords: Synchronous music, psychophysiology, running; heat

INTRODUCTION

Listening to music while engaging in physical activity is common practice for legions of exercise participants. Many studies have shown that music provides an ergogenic effect when synchronized to physical movement (e.g., Karageorghis et al., 2009; Terry et al., 2012). Karageorghis et al. (2009) found that synchronous music enhanced the emotional states of female participants during circuit-type exercise. According to Karageorghis et al. (1999), motivational music is characterised mainly by a fast tempo of more than 120 beats per minute (bpm) and a strong rhythm, which is inclined with the physiological energy, heart rate, and trigger bodily action. According to Terry et al. (2012), in their study on the effects of synchronous music on treadmill running among triathletes by comparing motivational, neutral and no music, they found that motivational music was associated with small-to-moderate and neutral music was associated with a moderate-to-large benefit in terms of running economy as compared to the no-music control of elite triathletes. The application of synchronous in music involves performing repetitive movements in time with its rhythmical elements such as the beat or tempo (Terry & Karageorghis, 2006). A study by Karageorghis et al. (2009) was conducted comparing motivational synchronous music, neutral synchronous music and no music condition during treadmill walking. Participants walked to exhaustion starting at 75% maximal heart rate reserve, in motivational and neutral synchronous music conditions and a no music control condition. Results showed that
endurance performance was superior in both music conditions than no music condition, with motivational music yielding greater beneficial effect.

Music manipulation accounted for 38% of the variance in endurance time, thus underlining the significance of this stimulus as a potential ergogenic aid in walking performance. The motivational music showed a 15% increase in treadmill endurance over no music condition and a 6% increase over neutral synchronous music (Karageorghis et al., 2009). The results of the study also aligned with the study by Bood et al. (2013) that examining the relative effects of auditory-motor synchronisation and the motivational impact on acoustic stimuli on running performance. Bood et al. (2013) found that time to exhaustion was significantly longer with acoustic stimuli than without. The beat of the stimuli helped runners to maintain a consistent pace by coupling cadence to the prescribed tempo because it helps to elevate physiological effort at a high perceived exertion meanwhile the correct cadence stimulated by auditory-motor synchronisation lead to a better running economy (Bood et al., 2013). On anaerobic performance, Simpson and Karageorghis (2006) investigated the effects of synchronous music on 400-m sprint performance by performing 400-metre time trials under conditions of motivational music, neutral music and a no-music control has found that the synchronous music yield superior performance (shorter time to cover 400-metre track) to a no music control. They found that the motivational synchronous music condition did not appear to be superior to neutral condition. Simpson & Karageorghis (2006) concluded in their study that the rhythmical anaerobic motor task to music in synchronous music can have a strong impact on performance regardless of the motivational quality of the music played.

In tropical countries such as Malaysia, athletes and exercisers are physically active for prolonged period in hot, humid conditions, which typically results in impaired performance (Tatterson et al., 2000; Saat et al., 2005; McMorris et al., 2006). The effects of listening to synchronous music while exercising in the heat are unknown. The present study assessed running time-to-exhaustion in hot, humid conditions with synchronous music compared to no music, and also examined whether listening to synchronous music affected Rating Perceived Exertion of recreational athletes.

METHOD

Participants
Twelve healthy male participants (mean age = 21.7 ± 2.2 yr.) who ran at least three days per week were recruited as participants. Body mass index (BMI) of participants was 21.83 ± 2.96 kg.m⁻². Maximal oxygen uptake (VO₂ max) of participants assessed at baseline was 59.29 ± 5.95 ml.kg⁻¹.min⁻¹. Baseline VO₂ max data were used to calculate running intensity for each participant during the experimental trials. The Physical Activities Readiness Questionnaire (PAR-Q, revised 2002), informed consent and participant demographic sheet were completed prior to participation. The required sample size was estimated using G-Power Version 3.1 (Faul et al., 2007). Based on a repeated-measures ANOVA with 2 exercise conditions (synchronous music and no music) x 3 time points (baseline, mid, post), statistical power set at 80% with a 95% confidence interval, and an effect size of 0.64 (Terry et al., 2012; VO₂ max), a sample size of 12 participants were judged to be sufficient to detect the hypothesized differences between exercise conditions.

Instruments

Procedure
The protocol of this study consisted of five visits for each participant, approximately two hours per session. The preliminary study includes a music selection, anthropometric, sub-
maximal test, maximum oxygen uptake (\(\dot{V}O_2\text{max}\)) test, and the familiarisation trial, in the first three sessions. The experimental trial were randomised either running in the heat with synchronous music, followed by running in the heat with no music, or vice versa, on the fourth and fifth sessions.

In this randomised cross-over study, 2 separate experimental trials were conducted in the climatic chamber. Each experimental trial was conducted on a motorised treadmill for 60 min at 60% \(\dot{V}O_2\text{max}\) followed by an 80% \(\dot{V}O_2\text{max}\) run to exhaustion. Running to exhaustion time was also recorded. RPE was recorded pre-task, in-task (15min, 30min, 45min, 60min), and immediately after the run to exhaustion.

**Music Selection**
A shortlist of 20 music tracks with potential to be synchronised to individual running stride (1 or 2 strides per beat) were selected using the protocol recommended by Karageoghis (2008) and rated for motivational qualities by 10 health science undergraduate students using the Brunel Music Rating Inventory-3 (BMRI-3; Karageoghis, 2008). Music tracks with BMRI-3 ratings of 36-42, indicating motivational qualities, were shortlisted. Participants chose their preferred music from the shortlist, which then assessed for synchronicity with running stride and small adjustments made to tempo (\(\leq 4 \text{ bpm}\)) using the Virtual DJ software.

**Exercise Laboratory Ambient Temperature, Relative Humidity and Music Setting.**
Figure 1 shows a schematic of the experimental set up. An hour prior to exercise testing, the exercise laboratory was heated to 31°C using halogen lamps (Philips-500W, France). Humidity was established at 70% using a water-bath (Memment W350t, Germany). A standing fan was used to mimic airflow in an open environment. Ambient room temperature and relative humidity were monitored continuously using a digital psychrometer kit (Extech Instrument RH305, USA). Music was played via a laptop computer using Virtual DJ software with one speaker (Sony GTK-XB90) placed 1 m in front of participants at 45˚ angles. Music volume was set at 75 dB, as recommended by Alessio and Hutchinson (1991).

**Data Analyses**
Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS version 22.0). Numerical variables were described as means (\(M\) ± standard deviation (\(SD\)), and distributions of all variables were assessed for normality. No non-normal distributions were identified. Mixed factorial ANOVAs and pairwise comparisons were conducted on RPE. A paired samples \(t\) – test was used to compare time to exhaustion between the two experimental conditions.

**Results**
The aim of this study is to examine the effects of synchronous music on participants’ running performance and RPE. The effects of synchronous music on running performance is represented in Table 1. The results indicated that the running time-to-exhaustion in the synchronous music condition was significantly higher (\(t=-2.63, p < 0.05\)) compared to the no-music condition.

<table>
<thead>
<tr>
<th></th>
<th>No music</th>
<th>Synchronous music</th>
<th>(t)</th>
<th>(p) value</th>
<th>Effect size ((d))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time-to-exhaustion (s)</td>
<td>226 ± 150.32</td>
<td>376.50 ± 304.97*</td>
<td>-2.63</td>
<td>.02</td>
<td>0.63</td>
</tr>
</tbody>
</table>

*\(p \leq .05\).*

**Table 1.** Time-to-exhaustion for 12 runners under synchronous music and no music conditions. Data expressed as mean ± standard deviation.
Table 2 show RPE values for 12 runners during the synchronous music and no music conditions. Mixed factorial ANOVA identified a significant difference in perceived exertion over time, $F(5,18) = 63.234, p < .001, \eta^2 = .946$, and between groups, $F(1, 22) = 4.690, p = .041, \eta^2 = .176$, but no significant interaction between time and group, $F(5, 18) = 1.117, p = .386, \eta^2 = .237$. RPE was significantly lower in the synchronous music condition throughout the steady state portion of the running trial, $(\delta = .72 – 1.05)$ even though the workload was objectively the same. Perceived exertion at the end of the run-to-exhaustion was lower $(\delta = .34)$ for the synchronous music condition even though participants had run for significantly longer at the same intensity.

<table>
<thead>
<tr>
<th></th>
<th>No Music</th>
<th>Synchronous Music</th>
<th>t</th>
<th>p value</th>
<th>Effect size (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPE – pre-test</td>
<td>6.83 ± 1.59</td>
<td>6.50 ± 0.90</td>
<td>1.30</td>
<td>.22</td>
<td>0.26</td>
</tr>
<tr>
<td>RPE – 15 min</td>
<td>9.92 ± 2.57</td>
<td>7.67 ± 1.61**</td>
<td>3.04</td>
<td>.01</td>
<td>1.05</td>
</tr>
<tr>
<td>RPE – 30 min</td>
<td>11.17 ± 2.48</td>
<td>8.83 ± 2.55**</td>
<td>3.39</td>
<td>.01</td>
<td>0.93</td>
</tr>
<tr>
<td>RPE – 45 min</td>
<td>13.08 ± 2.15</td>
<td>11.00 ± 3.05**</td>
<td>3.49</td>
<td>.01</td>
<td>0.79</td>
</tr>
<tr>
<td>RPE – 60 min</td>
<td>14.58 ± 2.23</td>
<td>12.83 ± 2.59**</td>
<td>3.17</td>
<td>.01</td>
<td>0.72</td>
</tr>
<tr>
<td>RPE – exhaustion</td>
<td>17.83 ± 2.08</td>
<td>17.00 ± 2.80</td>
<td>1.36</td>
<td>.20</td>
<td>0.34</td>
</tr>
</tbody>
</table>

**Table 2.** RPE for 12 runners under synchronous music and no music conditions. Data expressed as mean ± standard deviation.

**p≤.01.

**Discussion**

The present study investigated effects of listening to synchronous music on physiological, psychophysiological and performance measures under heat stress conditions. This was a randomized, crossover study in which participants completed two experimental trials in random order.

Generally, in this study, RPE was lower in the synchronous music condition from the initial stage of experiment trial until the point of exhaustion but was not statistically significant. From an interview on participants' experience in this study, they claimed that the motivational qualities of the music distracted them from exercise exertion. Similar result was shown by the study conducted by Atkinson et al (2004) which demonstrated the benefits of music on the rate of perceived exertion where participants perceived less effort during the first 3 km of cycling in the music condition compared to the no-music condition. However, their study did not mention the type of music used, whether it is synchronous or asynchronous. Music, therefore, seems to be particularly effective in distracting the exerciser away from his or her perceived exertion and associated discomfort (Edworthy & Waring, 2006). Edworthy & Waring (2006) suggests that with the absence of external stimulation, participants may focus more on their own efforts and perceived them to be higher. This is aligned to the current study where the participants in the no music condition shared their experience in which they claimed they were kept thinking on the remaining time to finish while performing the experimental trial. In synchronous music condition, they were guided by the beat of the song and were being motivated to continue their running by the motivational quality of the song without being too focused on the efforts during running. This result supported the finding of Bood et al. (2013) that synchronous motivational music reduced perceived exertion of sub-maximal running intensity.
Results clearly showed an ergogenic effect of music, with a significant increase in running time-to-exhaustion for the synchronous music condition compared to no music condition. The previous study by Terry et al. (2012) in the use of synchronous music on triathlete athletes also showed beneficial effects on running performance where synchronous music aiding in increased run-to-exhaustion times by more than a minute.

**Conclusion**
In conclusion, the results showed that running under heat stress with synchronous music improved running performance by extending time in running to exhaustion. However, there was no significant difference can be seen in the parameters of physiology. Differences can be seen in psychological parameter where RPE was lower in synchronous group.

**Acknowledgement**
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Self-Perception of Motor Performance in Adults with Developmental Coordination Disorder
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Abstract

Developmental coordination disorder (DCD) is a situation defined as very poor motor performance without mental or other clinical disease but interferes one’s daily living functions and academic achievements. Purpose of this study was to investigate the self-perception related to motor performance of adults with DCD. Motor performance of participants was evaluated with the Movement Assessment Battery for Children (M-ABC) and those score over 10 points were grouped as DCD. Participants included 9 male and 8 female undergraduates who were confirmed with DCD and 17 age- and gender-matched control group. The Chinese version M-ABC checklist for 11-12 year-old level (QA) and the Questionnaire of present motor insight (QB) were used to evaluate self-perception (QA1-4, QB1-4) of motor performance related to 11-12 years old and the present time of participants. Data was presented as mean ± SE and tested with unpaired t-test (a=0.5). The results demonstrated that the scores of QA1-4 (6.6±1.8) and QB1-4 (4.1±1.0) of all DCD were significantly higher than normal controls (2.8±1.1 and 2.0±0.6). Further, the QA1-4 of female DCD (8.8±2.4) was significantly higher than male DCD (4.4±1.2). However, no difference was found in scores of B1-4 between male (3.5±0.8) female (4.7±1.2) DCD participants. The results indicate that since the age of 11-12 years old, DCD adults had become aware of their poor motor performance and the perception could be sustained till young adulthood. In addition, female DCD were more sensitive than DCD males regarding to motor performance at the age of 11-12 years old.

Keywords: developmental coordination disorder; motor performance; self-perception

INTRODUCTION

Developmental coordination disorder (DCD) was defined as individuals show impaired control of voluntary motor activities since early life span and without known medical condition or pervasive developmental disorder (APA, 2013). Observations revealed that children with DCD have problems in activities of daily living as well as academic performance (Niemeijer, Smits-Engelsman, Reynders, & Schoemaker, 2003). DCD associated lower self-esteem (Poulsen, Ziviani, & Cuskellt, 2007) and psychosocial problems (Dewey, Kaplan, Crawford, & Wilson, 2002) were also reported. Longitudinal studies found that coordination difficulties in about half of children with DCD were
continuously present as they grow into adulthood (Cantell & Kooistra, 2002; Cantell, Smyth, & Ahonen, 2003; Kirby, Sugen, Beveridge, & Edwards, 2008). A common functioning difficulty of DCD adult is learning to drive (Cousins, & Smyth, 2003; Kirby, Edward, & Sugden, 2011, de Oliveira & Wann, 2012). According to recent longitudinal investigations, DCD adult were scored with lower on participation, quality of life, and life satisfaction compared to peers (Kirby, Williams, Thomas, & Hill, 2013; Tal-Saban, Ornoy, & Parush, 2014).

The prevalence of DCD had been estimate as 5-6 % in 5- to 11-years old children (APA, 2013). Interestingly, the 18 % (7-11-years-old) and 12 % (7-8-years-old) high prevalence were reported in Japan (Miyahara, et al., 1998) and Taiwan (Lin & Wu, 2002), respectively. Although young adult DCD were found as well (Chyi, Cheng, Chuang, 2005) as well, investigation of individuals with DCD in their post-child life span is lacking in Taiwan. Thus, purpose of this study was to examine the self-perception related to motor performance of young adults with DCD.

METHODS

Participants. Young adults with poor 30-sec rope-jumping performance had been highly correlated with DCD (Chyi, Cheng, & Chuang, 2005). Therefore, poor rope-jumpers from university PE classes and their age- and gender-matched friends/classmates were invited to join this study. Participants in this study were 34 university students (male = 17, female = 17) with age of 19-21 years old recruited from one university in Taiwan. Individuals were observed and contacted through the permissions of PE teachers in an appointed date. Then, we briefly introduced ourselves and informed participants the purpose of the research, confidentiality, and anonymity of their participation. Another dates were arranged for those who were interested in this study for signing of informed consent, examining of motor coordination performance and completing of the Movement Assessment Battery for Children Checklist (QA) and Questionnaire of present motor insight for young adult (QB). The procedure took approximately 90 minutes.

Motor Coordination Performance. Movement Assessment Battery for Children (M-ABC, Henderson & Sugden, 1992) is a wellknown and popullar tool which was applied to verify the developmental coordination disorder in children. M-ABC includes 3 group motor tests and each one with 2 or 3 kinds of tasks for children in 4 age groups, i.e., 4-6, 7-8, 9-10, and 11-12 year-old. Namely, the 3 main groups of tests are manual dexterity, ball skill and balance. Tests of 11-12 year-old level are manual dexterity (turning pegs, cutting-out elephant, and flower trail), ball skill (one-hand catch and throwing at wall target) and balance (two-board balance, jumping and clapping, and walking backward).

The acknowledged motor battery for use with adults is lacking yet, however, according to general human motor development, normally physical and mental young adults should sucessfully accomplish tasks designed for ordinary children. Thus, in the current studt, adults who were scored 10-13.4 or over 13.5 points of the 11-12 year-old level MAB-C was defined as borderline DCD or DCD adults, respectively.

Motor Coordination Self-Perception. Two questionnaires were used to investigate the motor coordination perception of participants.

Movement Assessment Battery for Children Checklist (QA). The Movement Assessment Battery for Children (M-ABC) includes 2 parts. The moter tasks are used to examine and assess the motor coordination performance of children which mentioned afores. The checklist is desighned for parents and/or teacher to response the motor charactristics of certain children. The first Chinese version M-ABC check list (QA) was used
in Hsu’s doctoral dissertation (Hsu, 2002). Unconventionally, in the present study, participants were asked to answer the QA with views as they are looking back to themselves as the grade-5 or -6 pupils. Thus, results of QA was used to assess the early motor self-perception of participants.

Participants identified their responses using a four-point Likert scale that ranged from 0 (always) to 3 (never). Four QA subscales were ‘child stationary/environment stable’, ‘child moving/environment stable’, ‘child stationary/environment changing’ and ‘child moving/environment changing’. Each subscale contains 12 items, i.e., there are 48 items of QA. The sample question for child stationary/environment stable is “I did not need help with self-care tasks, such as tying shoe laces, fastening buttons, and zipping”; for child moving/environment stable is “I did not bump into still things or persons in classroom or campus”; for child stationary/environment changing is “I could transfer object such as a book or pencil to next person”; and for child moving/environment changing is “I did not bump into things or persons while walking in classroom or campus”. The higher the number that participant identified indicated the worse of motor coordination performance in one’s experiences.

Questionnaire of present motor insight for young adult (QB). The questionnaire of present motor insight for young adult (QB) was derived from the report of Cousins and Smyth (Cousins & Smyth, 2003). The results of QB was used to assess the current motor self-perception of participants. Subscales of QB were parallel to those of QA. Participants identified their responses using a four-point Likert scale that ranged from 0 (always) to 3 (never). Four QB subscales were ‘manual dexterity’, ‘avoiding obstacles’, ‘interceptive activity’ and ‘balance’ which containing 6, 5, 7, and 4 items, respectively. Thus, there are 22 items of QB. The sample question for manual dexterity is “I write neatly”; for avoiding obstacles is “I avoid team games or sport”; for interceptive activity is “Rope-jumping, ball passing, or ball striking is not difficult for me”; and for balance is “I ride bicycles”. The higher the number that participant identified indicated the worse of motor coordination performance in one’s current status.

Data Analysis. Values were presented as mean ± S.E. Student’s unpaired t test was used to compare the difference between DCD and peer groups. A significant level was set as p<.05.

RESULTS

In order to assess current motor skill of young adult participant, MAB-C test for 11-12-year-old group was applied to all participants. The MAB-C score of 10 and 7 participants were higher than 13.5 and 10 points, respectively. Thus, those 17 participants were grouped as the DCD group. However, all peers were recorded under 10 points.

Table 1 illustrates the motor performance of participants with MAB-C scores in detail. The MAB-C scores of male DCD of manual dexterity (2.0±1.4) and balance (5.3±1.8) were significantly higher than peers (0.0±0.0, 0.0±0.0). Besides, the sub-score of ‘one-hand catch’ in ball skill of male DCD (3.3±1.3) was significantly higher than peers (0.0±0.0). Similar results were found in females. Scores of ball skill (5.2±2.0) and balance (7.0±2.0) of female DCD were significantly higher than peers (3.2±3.5, 0.0±2.0). Yet, no difference of manual dexterity was found between female DCD and peers. The results demonstrated that there are some young adults could not successfully accomplish the coordination motor tests that were suggested for 11-12-year old children. That is, particular students with DCD exist in university/college campus is a fact.
Table 2 illustrates the responses of participants to QA and QB. Both genders of DCD answered with a higher trend than peers in 4 subscales and the average scores of QA. The significant high scores were found in QA3 and QA4, namely, the child staying/environment moving and child moving/environment moving settings. The results indicated that young adult DCD had been realized that they may have motor difficulties at the age of 11-12 year-old. In addition, the motor difficulties were easily to be noticed by DCD themselves in unstable environments like batting a flying ball or bouncing a ball while walking. On the other hand, the QA3 and average scores of female DCD and QA2 and QA4 scores of female peers were significantly higher than male DCD and male peers, respectively. The finding indicated that female young adults may perceived their motor behaviors more sensitively than males at the age of 11-12 year-old.

A similar scored pattern was found in the participants’ responses to QB. Scores of QB2-4 and average of male DCD were significantly higher than those of peers. Likewise, score of QB1, 3-4, and average of female DCD were significantly higher than those of peers. The results showed that young DCD clearly perceived the coordination impairments without gender difference. Interesting, the only significant defference was found between male and female peers of QB3. The results may revealed that not only young adult DCD but also female peers were not confident while executing interceptive activities such as rope-jumping or ball striking.

<table>
<thead>
<tr>
<th></th>
<th>DCD</th>
<th>Peer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Dexterity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turning Pegs</td>
<td>2.0±1.4*</td>
<td>0.0±0.0</td>
</tr>
<tr>
<td>Cutting-out Elephant</td>
<td>0.3±0.5</td>
<td>0.0±0.0</td>
</tr>
<tr>
<td>Flower Trail</td>
<td>1.0±1.0*</td>
<td>0.0±0.0</td>
</tr>
<tr>
<td>Ball Skill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-hand Catch</td>
<td>3.3±1.3*</td>
<td>0.0±0.0</td>
</tr>
<tr>
<td>Throwing at wall Target</td>
<td>2.3±1.0</td>
<td>0.0±0.0</td>
</tr>
<tr>
<td>Balance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two-board Balance</td>
<td>3.2±1.9*</td>
<td>0.0±0.0</td>
</tr>
<tr>
<td>Jumping and Clapping</td>
<td>1.1±1.0*</td>
<td>0.0±0.0</td>
</tr>
<tr>
<td>Walking Backward</td>
<td>1.0±0.7</td>
<td>0.0±0.0</td>
</tr>
<tr>
<td>Total Score</td>
<td>13.1±2.1*</td>
<td>0.0±0.0</td>
</tr>
</tbody>
</table>

M, male; F, female. Values were presented as mean ± S.E. Student’s unpaired t test was used between groups, p<0.05. *, Significant difference between male DCD and peer; #, Significant difference between female DCD and peer.

Table 1 Performances of participants in the Movement Assessment Battery for Children test.
DISCUSSION

The major finding of this study is the young adult DCD without early diagnosis had perceived their coordination impairment at the age of 11-12 year-old. In addition, insights of female DCD were more sensitive than male DCD while they were 11-12 years old. However, as grow into young adulthood, no difference of insight was found between male and female DCD.

Many longitudinal researches had reported that coordination impairments of children may continuously lasting to adolescence and even longer (Cantell & Kooistra, 2002; Cantell, Smyth, & Ahonen, 2003; Fox & Lent, 1996; Kirby, Sugden, Beveridge, & Edwards, 2008). Besides, according to an early study, coordination movements with more difficulties were categorised into the ‘child staying/environment moving’ and ‘child moving/environment moving’ but the ‘child staying/environment still’, ‘child moving/environment still’ situations (Wright, 1994). Thus, firstly, our results are in accordance with previous longitudinal researches that coordination impairment could be a life span issue. Secondly, no matter as a DCD child, teenager or young adult, executing motor behaviors in moving environments are more difficult than in stationary environments.

Henderson and Sugden (1992) considered that motor behavior of adult was related to the motor performance in one’s childhood. Young adults with DCD endured influences on academic and non-academic functions, as well as emotional harassment and low life-
satisfaction were reported (Hill, Brown, & Sorgradt, 2011; Kirby, Edwards, Sugden, & Rosenblum, 2010; Kirby et al., 2013; Mandich, Polatajiko, & Roger, 2003; Tal-Saban et al., 2012). With regard to the wellbeings of adolescents and adults with DCD, a checklist for further and higher education (Kirby, 2011) and another questionnaire for adolescent and adults (Tal-Saban, Ornoy, Grotto, & Parush, 2012) had been constructed and evaluated as the valid and reliable tools to screen for motor coordination impairment in adolescent and adults. Defining adult DCD remains a challenge yet (Williams, Thomas, & Kirby, 2015). Nevertheless, for a time and manpower economic reason, we suggest that the 30-sec rope-jumping test may serve as the first step of a gross screening survey for teachers and clinical staffs.

Contrasting with the abundant and multifarious reports of DCD from Europe and North America, recent Asian DCD studies were rare and usually focused on pre-schoolers or pupils. Furthermore, most of the parents, teachers, and pediatrists are unfamiliar to the terminology and definition. Thus, to establish a integrated profile which including motor, psychosocial, and functioning informations of Asian young adult with DCD is necessary and important.

CONCLUSION

Results of the current study reveal that young adult DCD performed poorly with a 30-sec rope-jumping test. In addition, since the age of 11-12 years old, DCD adults had become aware of their poor motor performance and the perception could be sustained till young adulthood. Especially, female DCD seems are more aware than DCD males regarding to their motor performance at the age of 11-12 years old.

REFERENCES


Enhancing Self-efficacy Level through Pre-Exposure Programme (PEP) Prior to Clinical Placement among Physiotherapy Students of Asia Metropolitan College Kuching

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Abstract

Self-efficacy in healthcare education has been emphasised more in recent years. The transition from theoretical knowledge to clinical practice among healthcare students is a gap to cross of which high perceived level of self-efficacy beliefs may assist with the implementation of a pre-exposure programme (PEP) in a college set up. Students underwent this PEP were to assess and treat clients with musculoskeletal, sports and occupational-related injuries. The purpose of this study is to identify the self-efficacy level of fourteen of semester five physiotherapy students (Year Two) of Asia Metropolitan College Kuching pre and post PEP, prior to their clinical placement in Year 3. Each of them was to complete a set of questionnaire consisting of 20-item-PTstuCSES. The findings from Wilcoxon T test indicated that there is no significant differences in self-efficacy level among the respondents in pre and post PEP (T=32.00, p>.05). The implications of practice were further discussed.

Keywords: Self-efficacy, physiotherapy students, professional socialisation

INTRODUCTION

To enter into a professional healthcare clinical set up from a college-based set up has always been a challenging task for healthcare students. Not only do the students need to equip their fundamental knowledge well, but they also have to undergo a struggling period of time prior to becoming an independent professional in healthcare. This gap between theory and practice has been identified as often enough, people have difficulty overcoming an ideal imagination to the reality world (Kramer, 1974). On top of this, the gap has also become a challenge for healthcare educators and clinical instructors to bridge off. Complex type of diseases in nowadays rapid changing environment could have add on to the extra challenges too (Bartlett et. al, 2009).

Delivering only therapeutic knowledge and skills from healthcare educators are inadequate in educating healthcare students as they need to be guided into professional values development as well. This internalisation of a set of values and culture of profession is what being defined as professional socialisation (Zarshenas et. al., 2014). Through professional socialisation, healthcare educators support the learners in collaborating education with clinical experience (Lisa et. al, 2014), as without the collaboration of academic (on-site) and
clinical experiences (off-site curricular components), there is lacking of explicit continuum of knowledge transferring in between the students and the faculty (Bartlett et al., 2009). In addition, Condon & Sharts-Hopko (2010) pointed out that professional socialisation is multidimensional and is affected by classroom experience, clinical practice and extracurricular elements.

Professional socialisation is a life process, where it can first started to develop at a stage as early as in students, termed as the junior stage by Bartlett et al. (2009). Growing realisation of self-confidence tends to develop with the ability to reason clinically and with flexibility, of which later transformed into self-efficacy beliefs once their clinical skills are well-possessed. This qualitative design in the form of a reflection was participated by forty-four physiotherapy students undergoing 3 clinical experiences, detailing on the progression of the professional socialisation process that can be a guide particularly for physiotherapy educators in healthcare studies. Hayward et.al (2013) also concluded that self-efficacy is a vital factor for professional development in health care students and is important in preparing physiotherapy students for clinical practice.

In view of transition from a Year Two college-based student to a Year Three clinically-posted learning clinician being two vital stages prior to become a professional, an extracurricular named the pre-exposure programme (PEP) is proposed at Asia Metropolitan College Kuching (AMCK), to allow the physiotherapy students to have a real experience on assessing and treating patient on campus-based set up. This act of attempt is intended to integrate theoretical knowledge with clinical exposure through a curricular component. Particularly, the educational programmes of health science, it is vital to have a form of introductory clinical experience, of which could be in the form of hands-on exposure to treat real patient for the familiarisation or preparation of the students prior to their clinical posting at various set up. This inevitably will help to reduce the theoretical gap with the real clinical practice (Beverly & Jean, 2006). The investigations from Beverly & Jean (2006) also stated that physiotherapy students learn best with clinical instructors when they were involved directly in patient care, hands-on experience appropriate to their level of knowledge and skills, preparation of possible clinical encounters as well as confirmation of their learning in the introductory placement.

Not forgetting the influence of self-efficacy based on the social cognitive theory by Bandura (1994) where again, is further emphasised here, looking more into ‘perceived capability to perform’ than ‘intention to perform’. He addressed self-efficacy as an important contributor towards success and future achievements. The sources of self-efficacy may derived from self-experience, modeling influences, verbal persuasion and mood alterations (Bandura 1994). Four major processes underlying the social cognitive theory are in the area of cognitive, motivational, affective and selection. Through cognitive process, a sense of high self-efficacy will bring along positive impact on performance whilst low self-efficacy brings setback in most of the situation. As motivation is mostly generated cognitively, people with high efficacy tend to self-motivate and move towards the likely positive outcomes. Nonetheless, due to the complexity of human being of which affect the affective domain, people with low perceived self-efficacy prone to succumb under threats. Lastly, choice and development of career is none other than one of the example that is hugely influenced by the power of self-efficacy through selection process (Bandura, 1994). In sum, this self-belief of competency and self-efficacy in specific areas, may it be task- or situation-specific, could either build a success or lead to failure with time (Bandura 1994).

As self-efficacy level is more commonly applied in school settings, less in healthcare profession, more exploration and consideration in its application is worthwhile to make. The
PEP in this study, therefore acted as the reference in which its implementation is to be measured along with the strength of the students’ efficacy level.

LITERATURE REVIEW

Jones and Sheppard (2011) aimed to find correlation between self-efficacy level with clinical performance with an an additional of eight hours simulation training among thirty-two students (sixteen in control group & sixteen in intervention group) prior to and following their clinical placement. They pointed out that self-efficacy beliefs tend to be higher than their exact clinical performances.

In addition, Jones and Sheppard (2012) further worked on developing a measurement tool for assessing physiotherapy students’ self-efficacy level and its correlation as predictor of academic achievement. sixteen of third year physiotherapy students were involved following completion of their pre-clinical theory and a 13-item-questionnaire assessing their self-efficacy beliefs were to compare alongside with their academic grade. They concluded that self-efficacy measurement may be used in evaluating educational methods.

Onuki & Maruyama (2011) explored the self-efficacy stimulative scale on e-learning for physical therapy students via an exploratory factor analysis. Meanwhile, Lankveld et. al. (2017) looked into extended 39-item of Physiotherapist Self Efficacy (PSE) in Dutch to assess self-efficacy beliefs in three specific clinical areas namely musculoskeletal, neurology and cardiorespiratory area. They found out that physiotherapy students’ self-efficacy beliefs in key criteria of functioning are clinical area specific. In other words, it means that a student might have high self-efficacy in one particular clinical area, but low self-efficacy in another particular clinical area at the same time.

The role of religiosity, coping strategies, self-efficacy and personality dimensions were being examined in the study by Mirsaleh et. al (2010) in the prediction of satisfaction from clinical experience among rehabilitation interns formed by 318 undergraduates (physiotherapy, occupational therapy and speech and language pathology student). The result showed that self-efficacy is one of the important predictors of satisfaction in all the rehabilitation intern students of three disciplines.

Lastly, studies from other healthcare domain were put into review as well where there are Evans et al. (2004) that investigated on the effect of an extended five-days of hospital induction on a group of twenty-six newly qualified doctors from one district general hospital. The result showed significant improved perceived confidence in their assessed clinical skills. On the other hand, Berridge et al. (2007) that looked into implementation of two weeks of preparation programme from a protected undergraduated medical student (n=50) to an accountable practising doctor proved to be improved in its confidence both in preparedness to commence work and in clinical skills based on the collection of seventeen item questionnaire distributed on the first and final days of Preparation for Practice Course (PPC).

OBJECTIVE

This study was conducted with the purpose of evaluating the self-efficacy level of the physiotherapy student before and after the implementation of a PEP as an introductory clinical experience prior to their final year of clinical placement. It also aimed to serve as an bridge for the students to prepare themselves in terms of role transition from college-based students to learning clinicians not only in assessment and treatment of a real patient, but also to first expose them with a proper documentation technique. As discussed in the introduction above, the gap between transition of theoretical knowledge with clinical practice
is hopeful to be reduced in this study and enable stimulation of their clinical reasoning at the same time. As PEP implementation is a pilot study conducted at AMCK, the effectiveness is to be explored in determination of its worthwhileness of replication in the future study.

METHODS

Design

A quasi experimental design was chosen for this study. It involved repeated measure procedure where the students were asked to rate their self-efficacy level during pre and post PEP through a self-report questionnaire. On top of that, the inferential quantitative methods were also being performed by using IBM SPSS Statistics 20 for the collected data.

Participants

The participants of this study were second year diploma students (batch 201601/04) who had completed their required academic syllabus to deal with musculoskeletal, sports injury and occupational-related injury after twenty-six hours of lecture, twenty hours of practical and 6hours of tutorial; and are to go for their final full-time clinical placement in Year Three. Students were required to complete the self-efficacy questionnaire (PTstuNCSES) before and after the PEP.

Measure

To suit with the relevance and level of the targeted physiotherapy students, the researchers modified the Nursing Competence Self-Efficacy Scale (NCSES) (Kennedy, 2013) into a 20 items Likert-Scaled design survey form, which was then distributed during pre and post PEP to evaluate the self-efficacy of four main areas, namely proficiency, altruism, prevention and leadership of the students.

Items in proficiency are related to self-efficacy for competence in clinical practice while altruism refers to patient caring and advocacy. Having a global view in healthcare and prevention denotes the area of prevention whilst lastly, leadership factor looks at self efficacy in competency required in healthcare leadership. It will be interesting in interpreting the scores in all four areas of which could be either high or low level in self-efficacy in specific domains of practice among the students pre and post PEP.

Procedure

Prior to PEP, students were instructed to search for their own clients that suffered from any kind of musculoskeletal, sports or occupational related injuries in the campus site. Informed consent form was attained from the following clients of each student. The 20-item-PTstuNCSES was distributed for students to rate their self-efficacy level in the ability to articulate appropriate assessment and treatment for their identified clients. On the day of PEP, students assessed, treated and made proper documentation of their own clients in the designated two hours duration under the supervision of lecturers and/or clinical instructors. Personalized guidance and feedback was given on case-to-case basis, including the assessment, treatment and documentation. As PEP was meant to be held at campus site, the likely attending clients were being considered in the first place by the researchers. Therefore, both the cardiorespiratory and neurology cases were excluded from this study of which that happens to go in line with (Lankveld et. al, 2017) that self-efficacy beliefs should be assessed in relation to specific clinical areas. After completion of PEP, students were asked to rate themselves again using the 20-item-PTstuNCSES, to evaluate their self-
efficacy level in assessing and treating clients of the specific clinical area in future. In short, data for this study was collected from both pre and post PEP.

**Data Analysis**

In order to identify the significant difference on the self-efficacy level towards assessing and treating execution among the physiotherapy students pre and post PEP, the Wilcoxon Signed Rank Test was carried out to analyse the two sets of ordinal data obtained.

**RESULTS**

From Table 1 and 2, Wilcoxon T test showed that there is no significant differences in self-efficacy level among the participants in pre and post PEP (T=32.00, p>.05).

<table>
<thead>
<tr>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>po_se_pr_se Negative Ranks 7a</td>
<td>4.57</td>
<td>32.00</td>
</tr>
<tr>
<td>po_se_pr_se Positive Ranks 7b</td>
<td>10.43</td>
<td>73.00</td>
</tr>
<tr>
<td>Ties</td>
<td>0c</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

*a. po_se<pr_se
b. po_se>pr_se
c. po_se=pr_se

Note: pr_se: self-efficacy level pre PEP, po_se: self-efficacy level post PEP

Table 2. Test Statistics

<table>
<thead>
<tr>
<th>po_se-pr_se</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.287b</td>
<td>.198</td>
<td></td>
</tr>
</tbody>
</table>

*a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Interestingly, when the above finding was furthered studied and detailed via Boxplot graph (Figure 1), the Boxplot test actually indicated that the values of median were slightly different for self-efficacy level among the participants during pre (median=4.4) and post (median=4.6) PEP.
DISCUSSION

The findings of this study showed that the implementation of the PEP has not brought about any significant changes to the self-efficacy level of the targeted physiotherapy students. Weaknesses were identified whereby there was an overestimation of their perceived self-efficacy belief even before the PEP, of which does not really correlate with their actual clinical skills based on the feedback given by the supervised lecturers and clinical instructors. Jones and Sheppard (2011) have identified this non-correlation between perceived self-efficacy level with clinical performance in their study as well.

With that, the researchers of this study are looking forward to a better briefing of the questionnaire in future, to bring about better understanding of the students in order to attain a more accurate answer to the questionnaire. Not forgetting also the likely acquiescence bias factor mentioned by Lankveld et. al (2017) that may occur, whereby the students might have tendency to agree with all the questions although being instructed to give an honest answer in the first place by the researchers.

The researchers of this study believed that PEP does play a part in the learning process as it enable both the lecturers/clinical instructors and students to identify areas of strengths and weaknesses in students’ understanding and knowledge application. Students who were being acknowledged as having low level of self-efficacy could receive additional guidance from lecturers and clinical instructors. Meanwhile, students who have high level of self-efficacy can provide peer support to the weaker ones, as what is mentioned in Bandura (1994) that peers do serve in several important efficacy functions. In addition, the teaching/learning strategies under the Cognitive Apprenticeship Model (CAM) (Beverly & Jean, 2006) that involves articulation, exploration and reflection were being utilised in this study in terms of first challenging them into formulating appropriate assessment and
treatment for their clients, then to working independently under supervision, followed by reflecting on the comments given by lecturers and/or clinical instructors after completion of their documentation.

Secondly, the duration of this PEP which lasted for only two hours had been identified as one of the limitations too. It is to be suggested that future phases could be further explored with extended duration of PEP for a few days, or even weeks to better enhance the self-efficacy level of the physiotherapy students in a more meaningful way.

Last but not least, one interesting finding to be discussed here will be the boxplot shown in the result indicating that the range of the self-efficacy level actually increased slightly during the post PEP. This could be likely argued that the fourteen targeted physiotherapy students were more assured with their self-efficacy level after the PEP. This is somewhat consistent with the study conducted by Jones and Sheppard (2011) that participants who received additional eight hours of simulation training (intervention) did increase in their self-efficacy level.

**CONCLUSION**

Given this study being an inventory pilot study, the replication of this study with elimination of weaknesses discussed earlier may yield different results. In healthcare education, various kind of education interventions were proposed and examined with the intention to better guide the students into becoming an accountable professional. Although there was no significant finding of PEP towards self-efficacy level in this study, the good intention in justification of the implementation of PEP to reduce the gap of an observer-learner to a professional physiotherapist in the future was still encouraging. Therefore, more studies are to be explored to look into other educational interventions or even the effectiveness of PEP in better prepare the healthcare students prior to their clinical placement.

**Ethical Approval**

The study was approved by the higher management of Asia Metropolitan College Kuching, Malaysia. Permission was obtained to undertake the study from the respective centre manager of the college. Written consent was also obtained from all the participants.

**Acknowledgements**

This work was fully supported and funded by Asia Metropolitan College Kuching, Malaysia.

**REFERENCES**


Abstract

The purpose of this study was to compare the effects of health-related physical fitness of older person in Mueang Phetchabun Municipal District between control and experimental groups. Participants were divided into two groups, as 30 persons a group: a control group was assigned not to exercise, and an experimental group was given the Tai-Chi and elastic exercises. The exercise program was created and consisted of twelve skills of Tai-Chi used for stretching and cooling down session, as well as seventeen drills of elastic exercise. This program was, proved by three sport science experts, and lasted 60 minutes per time, three times per week, for eight weeks, at 04:30 – 05:30pm. For the data collection, a physical fitness test of older person developed by the Sport Sciences Office of Department of Physical Education, Ministry of Tourism and Sport of Thailand was used: (1) Chair stand test, (2) Arm curl test, (3) Chair sit and reach test, (4) Back scratch test, and (5) 2-minute test. Physical fitness Mean and Standard Deviation before training and after training at week 4 and after training at week 8 of experimental and control groups were used to study the effects of Tai-Chi and elastic exercises. Moreover, One-way Analysis Variance examined the difference of exercise of control group and experimental group before training and after training at week 4 and week 8. Alpha level at .05, and then used a paired comparing by Tukey method with Bonferroni. Results are (1) there were significant differences of all physical fitness effects of experimental group between before training and after training at week 4, (2) there were significant differences of all physical fitness effects of experimental group between after training at week4 and at week 8, except on cardiovascular endurance, (3) there were no differences of all physical fitness effects of control group between before training and after training at week 4, (4) there were no differences of all physical fitness effects of control group between before training and after training at week 4, (5) there were no differences of all physical fitness effects of control group between after training at week4 and at week 8, except on leg muscle strength and endurance, (6) there were no differences of all physical fitness effects of experimental group before training and after training at week 8, (7) there were no differences of all physical fitness effects between experimental group before training and control group after training at week 4, (8) there were significant differences of all physical fitness effects between experimental group after training at week 4 and control group after training at week 8, and (9) there were significant differences of all physical fitness effects between experimental group before training and control group after training at week 8. The results of this study are that Tai-chi and elastic exercises affecting the significant higher levels of muscle strength in older person than before training (Song et al., 2003; Paksa, 2010), as well as of muscle endurance (Kridsanakringkrai, 2007; Roger et al, 2002), and of physical fitness and cardiovascular endurance (Lau et al, 2004). This study suggested that aerobic and resistance exercises seem like Tai-chi and elastic exercises can help older persons to develop their health-related physical fitness.
Increasing number of older person in Thailand was high, and also impacted higher health service budget of Thailand. Currently, Thai has faced to health problem around 72 to 80 percent (Khuhirunyarat, 2011). Most are hypertension, diabetes, heart and vessel diseases producing low health-related physical fitness and organ function. Srilamad (2014) revealed that health-related physical fitness consists of cardiovascular endurance as a capability of circulation system and respiratory system in oxygen usage during doing physical activity. Muscle strength is capability of muscle to work out resistance. Muscle endurance is capability of muscle to continually work out by regardless of fatigue. Flexibility is joint range of motion. Body composition is relative volume among muscle, fat, bone, and other organs of body. This type of older persons are classified in earlier group who are healthy and able to travel to involve in activities of their community, however they can have an accidence, so they should get some exercise to maintain health-related physical fitness.

Elastic resistance is a resistant exercise which has been used to develop strength over pass 100 years. It is called the whiteley exercise making strength in male, body sharp in female, and development in children (krabuanrat, 1997). As for Tai chi, this type of exercise is for flexibility and relaxation as moving and breathing continually which is associated with motion of Chinese boxing dance as an aerobic exercise. This is no muscle contraction or work hard, so it is perfect for all ages and genders (Kridsanakringkrai, 2010). The purpose of this study was to compare the effects of health-related physical fitness of older person in Mueang Phetchabun Municipal District between control and experimental groups.

METHOD

Participants. Participants were 60 older persons who lived in Mueang Phetchabun Municipal District. Recruited by a multistage sampling, they were firstly recruited their health state (e.g. diabetes, blood pressure, heart and circulation diseases, and others associated with harm for exercise), secondly used a purposive sampling, and used a simple random sampling. Participants were divided into two groups, as 30 persons a group: a control group was assigned not to exercise, and an experimental group was given the Tai-Chi and elastic exercises.

RESEARCH TOOL

Exercise Program. The exercise program was created and consisted of twelve skills of Tai-Chi used for stretching and cooling down session, as well as seventeen drills of elastic exercise. This program was, proved by three sport science experts, and lasted 60 minutes per time, three times per week, for eight weeks, at 04:30 – 05:30pm. For the data collection, a physical fitness test of older person developed by the Sport Sciences Office of Department of Physical Education, Ministry of Tourism and Sport of Thailand was used: 1) Chair stand test, 2) Arm curl test, 3) Chair sit and reach test, 4) Back scratch test, and 5) 2-minute test.

PROCEDURES

Researcher gained approval from the Human Research Ethics Committee of Srinakarintraviroj University. Participants were recruited by a multistage sampling, they were firstly declared their health state (e.g. diabetes, blood pressure, heart and circulation diseases, and others associated with harm for exercise), secondly used a purposive sampling, and used a simple random sampling. Participants were divided into two groups, as 30 persons a group: a control group was assigned not to exercise, and an experimental group was given the Tai-Chi and elastic exercises. At last, participants were retested physical fitness and thanked for their intentional participation in this study.
Data Analysis
Physical fitness Mean and Standard Deviation before training and after training at week 4 and after training at week 8 of experimental and control groups were used to study the effects of Tai-Chi and elastic exercises. One-way Analysis Variance examined the difference of exercise of control group and experimental group before training and after training at week 4 and week 8, Alpha level at .05, and then used a paired comparing by Tukey method with Bonferroni.

RESULTS
Table 1 Comparison of Physical Fitness of Experimental Group between before Training and after Training at week 4

<table>
<thead>
<tr>
<th>Physical Fitness Test</th>
<th>Experim Group Before Training</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>1. Arm muscle strength and endurance</td>
<td>8.63</td>
<td>1.92</td>
<td></td>
</tr>
<tr>
<td>2. Leg muscle strength and endurance</td>
<td>17.43</td>
<td>3.18</td>
<td></td>
</tr>
<tr>
<td>3. Back, hip, and back leg endurance</td>
<td>-0.86</td>
<td>6.69</td>
<td></td>
</tr>
<tr>
<td>4. Left shoulder endurance</td>
<td>20.90</td>
<td>5.46</td>
<td></td>
</tr>
<tr>
<td>5. Right shoulder endurance</td>
<td>23.80</td>
<td>5.45</td>
<td></td>
</tr>
<tr>
<td>6. Cardiovascular endurance</td>
<td>84.26</td>
<td>11.23</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 shows that there were significant differences of all physical fitness effects of experimental group between before training and after training at week 4.

Table 2 Comparison of Physical Fitness of Experimental Group between after Training at week 4 and after Training at week 8

<table>
<thead>
<tr>
<th>Physical Fitness Test</th>
<th>Experimental Group After Training at week4</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>1. Arm muscle strength and endurance</td>
<td>12.96</td>
<td>2.52</td>
<td></td>
</tr>
<tr>
<td>2. Leg muscle strength and endurance</td>
<td>19.80</td>
<td>3.07</td>
<td></td>
</tr>
<tr>
<td>3. Back, hip, and back leg endurance</td>
<td>-0.10</td>
<td>6.38</td>
<td></td>
</tr>
<tr>
<td>4. Left shoulder endurance</td>
<td>20.13</td>
<td>5.44</td>
<td></td>
</tr>
<tr>
<td>5. Right shoulder endurance</td>
<td>22.93</td>
<td>4.74</td>
<td></td>
</tr>
<tr>
<td>6. Cardiovascular endurance</td>
<td>88.80</td>
<td>10.93</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 shows that there were significant differences of all physical fitness effects of experimental group between before training and after training at week 4.

Table 2 Comparison of Physical Fitness of Experimental Group between after Training at week 4 and after Training at week 8

<table>
<thead>
<tr>
<th>Physical Fitness Test</th>
<th>Experimental Group After Training at week4</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>1. Arm muscle strength and endurance</td>
<td>12.96</td>
<td>2.52</td>
<td></td>
</tr>
<tr>
<td>2. Leg muscle strength and endurance</td>
<td>19.80</td>
<td>3.07</td>
<td></td>
</tr>
<tr>
<td>3. Back, hip, and back leg endurance</td>
<td>-0.10</td>
<td>6.38</td>
<td></td>
</tr>
<tr>
<td>4. Left shoulder endurance</td>
<td>20.13</td>
<td>5.44</td>
<td></td>
</tr>
<tr>
<td>5. Right shoulder endurance</td>
<td>22.93</td>
<td>4.74</td>
<td></td>
</tr>
<tr>
<td>6. Cardiovascular endurance</td>
<td>88.80</td>
<td>10.93</td>
<td></td>
</tr>
</tbody>
</table>

*p<0.05
Table 2 shows that there were significant differences of all physical fitness effects of experimental group between after training at week 4 and at week 8, except on cardiovascular endurance.

Table 3 Comparison of Physical Fitness of experimental Group between before Training and after Training at week 8

<table>
<thead>
<tr>
<th>Physical Fitness Test</th>
<th>Experim Group Before Training</th>
<th>Experim Group After Training at week 8</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arm muscle strength and endurance</td>
<td>12.96 ± 2.52</td>
<td>16.20 ± 2.21</td>
<td>-18.385</td>
<td>0.000*</td>
</tr>
<tr>
<td>Leg muscle strength and endurance</td>
<td>19.80 ± 3.07</td>
<td>22.76 ± 3.44</td>
<td>-10.098</td>
<td>0.000*</td>
</tr>
<tr>
<td>Back, hip, and back leg endurance</td>
<td>-1.03 ± 6.38</td>
<td>2.70 ± 5.20</td>
<td>-8.282</td>
<td>0.000*</td>
</tr>
<tr>
<td>Left shoulder endurance</td>
<td>20.13 ± 5.44</td>
<td>19.36 ± 5.09</td>
<td>3.972</td>
<td>0.000*</td>
</tr>
<tr>
<td>Right shoulder endurance</td>
<td>22.93 ± 4.74</td>
<td>21.96 ± 4.75</td>
<td>4.300</td>
<td>0.000*</td>
</tr>
<tr>
<td>Cardiovascular endurance</td>
<td>88.80 ± 10.93</td>
<td>89.00 ± 11.85</td>
<td>-3.912</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

* p < 0.05

Table 3 shows that there were significant differences of all physical fitness effects of experimental group between before training and after training at week 8.

Table 4 Comparison of Physical Fitness of Control Group between before Training and after Training at week 4

<table>
<thead>
<tr>
<th>Physical Fitness Test</th>
<th>Coi Group Before Training</th>
<th>Coi Group After Training at week 4</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arm muscle strength and endurance</td>
<td>9.13 ± 2.16</td>
<td>9.36 ± 1.93</td>
<td>-1.070</td>
<td>0.293</td>
</tr>
<tr>
<td>Leg muscle strength and endurance</td>
<td>17.46 ± 2.81</td>
<td>17.43 ± 3.37</td>
<td>0.128</td>
<td>0.899</td>
</tr>
<tr>
<td>Back, hip, and back leg endurance</td>
<td>-1.03 ± 6.42</td>
<td>-73 ± 5.95</td>
<td>-1.511</td>
<td>0.142</td>
</tr>
<tr>
<td>Left shoulder endurance</td>
<td>20.80 ± 5.96</td>
<td>20.63 ± 5.70</td>
<td>0.694</td>
<td>0.493</td>
</tr>
<tr>
<td>Right shoulder endurance</td>
<td>22.93 ± 5.11</td>
<td>22.96 ± 5.10</td>
<td>-0.071</td>
<td>0.944</td>
</tr>
<tr>
<td>Cardiovascular endurance</td>
<td>84.13 ± 11.35</td>
<td>84.33 ± 10.86</td>
<td>-0.501</td>
<td>0.620</td>
</tr>
</tbody>
</table>

*p < 0.05

Table 4 shows that there were no differences of all physical fitness effects of control group between before training and after training at week 4.
Table 5 Comparison of Physical Fitness of Control Group between after Training at week 4 and after Training at week 8

<table>
<thead>
<tr>
<th>Physical Fitness Test</th>
<th>Control Group</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>After Training at week 4</td>
<td>x</td>
<td>SD</td>
<td>After Training at week 8</td>
<td>x</td>
<td>SD</td>
<td>t</td>
</tr>
<tr>
<td>1. Arm muscle strength and endurance</td>
<td>9.36</td>
<td>1.93</td>
<td>9.20</td>
<td>1.64</td>
<td>1.153</td>
<td>0.208</td>
<td></td>
</tr>
<tr>
<td>2. Leg muscle strength and endurance</td>
<td>17.43</td>
<td>3.37</td>
<td>18.03</td>
<td>3.25</td>
<td>2.902</td>
<td>0.007*</td>
<td></td>
</tr>
<tr>
<td>3. Back, hip, and back leg endurance</td>
<td>-.73</td>
<td>5.95</td>
<td>-.66</td>
<td>6.04</td>
<td>-1.000</td>
<td>0.326</td>
<td></td>
</tr>
<tr>
<td>4. Left shoulder endurance</td>
<td>20.63</td>
<td>5.70</td>
<td>20.80</td>
<td>5.81</td>
<td>-0.491</td>
<td>0.627</td>
<td></td>
</tr>
<tr>
<td>5. Right shoulder endurance</td>
<td>22.96</td>
<td>5.10</td>
<td>22.96</td>
<td>5.13</td>
<td>0.000</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>6. Cardiovascular endurance</td>
<td>84.33</td>
<td>10.86</td>
<td>84.93</td>
<td>10.53</td>
<td>-1.000</td>
<td>0.326</td>
<td></td>
</tr>
</tbody>
</table>

*p<0.05

Table 5 shows that there were no differences of all physical fitness effects of control group between after training at week 4 and at week 8, except on leg muscle strength and endurance.

Table 6 Comparison of Physical Fitness of Control Group between before Training and after Training at week 8

<table>
<thead>
<tr>
<th>Physical Fitness Test</th>
<th>Cont Group</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before Training at week 8</td>
<td>x</td>
<td>SD</td>
<td>After Training at week 8</td>
<td>x</td>
<td>SD</td>
<td>t</td>
</tr>
<tr>
<td>1. Arm muscle strength and endurance</td>
<td>9.13</td>
<td>2.16</td>
<td>9.20</td>
<td>1.64</td>
<td>-0.250</td>
<td>0.804</td>
<td></td>
</tr>
<tr>
<td>2. Leg muscle strength and endurance</td>
<td>17.46</td>
<td>2.81</td>
<td>18.03</td>
<td>3.25</td>
<td>-1.853</td>
<td>0.074</td>
<td></td>
</tr>
<tr>
<td>3. Back, hip, and back leg endurance</td>
<td>-1.03</td>
<td>6.42</td>
<td>-0.66</td>
<td>6.04</td>
<td>-1.779</td>
<td>0.086</td>
<td></td>
</tr>
<tr>
<td>4. Left shoulder endurance</td>
<td>20.80</td>
<td>5.96</td>
<td>20.80</td>
<td>5.81</td>
<td>0.000</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>5. Right shoulder endurance</td>
<td>22.93</td>
<td>5.11</td>
<td>22.96</td>
<td>5.13</td>
<td>-0.079</td>
<td>0.938</td>
<td></td>
</tr>
<tr>
<td>6. Cardiovascular endurance</td>
<td>84.13</td>
<td>11.35</td>
<td>84.93</td>
<td>10.53</td>
<td>-1.076</td>
<td>0.291</td>
<td></td>
</tr>
</tbody>
</table>

*p<0.05

Table 6 shows that there were no differences of all physical fitness effects of control group between before training and after training at week 8.
Table 7 Comparison of Physical Fitness between Experimental Group before Training and Control Group after Training at week 4

<table>
<thead>
<tr>
<th>Physical Fitness Test</th>
<th>Experimental Group Before Training</th>
<th>Control Group After Training at week 4</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\bar{x}$</td>
<td>$\bar{x}$</td>
<td>SD</td>
<td>SD</td>
</tr>
<tr>
<td>1. Arm muscle strength and endurance</td>
<td>8.63 1.92</td>
<td>9.13 2.16</td>
<td>1.249</td>
<td>0.222</td>
</tr>
<tr>
<td>2. Leg muscle strength and endurance</td>
<td>17.43 3.18</td>
<td>17.46 2.81</td>
<td>.097</td>
<td>0.923</td>
</tr>
<tr>
<td>3. Back, hip, and back leg endurance</td>
<td>-.86 6.69</td>
<td>-1.03 6.42</td>
<td>-.144</td>
<td>0.886</td>
</tr>
<tr>
<td>4. Left shoulder endurance</td>
<td>20.90 5.46</td>
<td>20.80 5.96</td>
<td>-.123</td>
<td>0.903</td>
</tr>
<tr>
<td>5. Right shoulder endurance</td>
<td>23.80 5.45</td>
<td>22.93 5.11</td>
<td>-.873</td>
<td>0.390</td>
</tr>
<tr>
<td>6. Cardiovascular endurance</td>
<td>84.26 11.23</td>
<td>84.13 11.35</td>
<td>-.055</td>
<td>0.957</td>
</tr>
</tbody>
</table>

*p<0.05

Table 7 shows that there were no differences of all physical fitness effects between experimental group before training and control group after training at week 4.

Table 8 Comparison of Physical Fitness between Experimental Group after Training at week 4 and Control Group after Training at week 8

<table>
<thead>
<tr>
<th>Physical Fitness Test</th>
<th>Experimental Group After Training at week 4</th>
<th>Control Group After Training at week 8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\bar{x}$</td>
<td>$\bar{x}$</td>
</tr>
<tr>
<td>1. Arm muscle strength and endurance</td>
<td>16.20 2.22</td>
<td>9.37 1.94</td>
</tr>
<tr>
<td>2. Leg muscle strength and endurance</td>
<td>22.77 3.44</td>
<td>17.43 3.37</td>
</tr>
<tr>
<td>3. Back, hip, and back leg endurance</td>
<td>2.70 5.21</td>
<td>-.73 5.95</td>
</tr>
<tr>
<td>4. Left shoulder endurance</td>
<td>25.67 1.81</td>
<td>20.63 5.70</td>
</tr>
<tr>
<td>5. Right shoulder endurance</td>
<td>25.67 2.52</td>
<td>22.97 5.11</td>
</tr>
<tr>
<td>6. Cardiovascular endurance</td>
<td>89.00 11.86</td>
<td>84.33 10.86</td>
</tr>
</tbody>
</table>

*p<0.05

Table 8 shows that there were significant differences of all physical fitness effects between experimental group after training at week 4 and control group after training at week 8.

Table 9 Comparison of Physical Fitness between Experimental Group before Training and Control Group after Training at week 8

<table>
<thead>
<tr>
<th>Physical Fitness Test</th>
<th>Experimental Group Before Training</th>
<th>Control Group After Training at week 8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\bar{x}$</td>
<td>$\bar{x}$</td>
</tr>
<tr>
<td>1. Arm muscle strength and endurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Leg muscle strength and endurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Back, hip, and back leg endurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Left shoulder endurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Right shoulder endurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Cardiovascular endurance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

155
Table 9 shows that there were significant differences of all physical fitness effects between experimental group before training and control group after training at week 8.

**CONCLUSION**

The results of this study can be summarized as that 1) there were significant differences of all physical fitness effects of experimental group between before training and after training at week 4, 2) there were significant differences of all physical fitness effects of experimental group between after training at week 4 and at week 8, except on cardiovascular endurance, 3) there were no differences of all physical fitness effects of control group between before training and after training at week 4, 4) there were no differences of all physical fitness effects of control group between before training and after training at week 4, 5) there were no differences of all physical fitness effects of control group between after training at week 4 and at week 8, except on leg muscle strength and endurance, 6) there were no differences of all physical fitness effects of control group between before training and after training at week 8, 7) there were no differences of all physical fitness effects between experimental group before training and control group after training at week 4, 8) there were no differences of all physical fitness effects between experimental group after training at week 4 and control group after training at week 8, and 9) there were significant differences of all physical fitness effects between experimental group before training and control group after training at week 8. The study indicated that Tai-chi and elastic exercises affecting the significant higher levels of muscle strength in older person than before training (Song et al., 2003; Paksa, 2010), as well as of muscle endurance (Kridsanakringkrai, 2007; Roger et al, 2002), and of physical fitness and cardiovascular endurance (Lau et al, 2004). This study suggested that aerobic and resistance exercises seem like Tai-chi and elastic exercises can help older persons to develop their health-related physical fitness.

**REFERENCES**


Song and Rhayun. (2003). Effects of tai chi exercise, on pain balance, muscle strength, and perceived difficulties in physical functioning in older women with osteoarthritis – a randomized clinical trial.


Abstract

Sepaktakraw serve is considered as a very important technique for beginning the game, so the accuracy of serve is needed. The cognitive specific imagery program can enhance the serving performance for which the 6-week training is sufficient an enhancement (Poompin, Chirathammawat, Bhungobs, & Bhasavanija, 2015).

Purpose: this study aimed to examine whether university level athletes' serving accuracy was higher after sepaktakraw serving skill imagery training than baseline.

Method: Participants were 24 Thai athletes (Male = 12, Female = 12) of Ramkhamhaeng University who were serving position players, the age range of 18 to 20 years old (19.05±.11). They were randomised and divided into two groups; Group 1 was assigned to practice as following the commonly used programme, and Group 2 was assigned to practice a serving skill imagery training programme together with a commonly used programme. Tools: 1) sepaktakraw serving accuracy test (Poompin et al, 2015), and 2) the imagery training programme was created as a cognitive specific imagery lasting approximately 10 min per day, 5 days per week, for 8 weeks.

Data Analysis: The serving accuracy data were collected and compared between at baseline, after 4-week and 8-week trainings, using the Paired t-test for comparison within and between groups. Results: This study results in; 1) There was no significant difference of serving accuracy at baseline between control group and experimental group, 2) after 8-week imagery training, there was no statistically significant difference within control group, and there was statistically significant difference within experimental group, and 3) there was statistically significant difference between control and experimental groups after training at Week 4, and also at Week 8.

Conclusion: The results of this study are similar to previous studies are that an imagery training programme on sport performance can be useful for enhancing the sport skills. This study suggests that imagery, as a mental technique, should be applied for sport coaching in order to help athletes to succeed their games.

Keywords: sepaktakraw; serving skill; imagery; serving accuracy

INTRODUCTION

Mental, Physical, technical, and tactical components have been studied to develop athletes depended on sport games (Moran, 2004). Particularly, in psychological techniques has been used for performance enhancement, motivation contribution, anxiety reduction (Krane, 1992). Imagery is a mental technique, useful for several aspects, such as a motivation general, arousal, or mastery, and cognitive specific (Bhasvanija, Vongjaturapat, Morris, & Muangnapo, 2011), associated with calling or recalling of thing, situation, or emotion in the past (Bhasvanija, & Morris, 2013), in which an imagery training programme on sport performance can be useful for enhancing the sport skills (Cherchang, Vongjaturapat, Anusananan, & Bhasvanija, 2014). Sepaktakraw serve is considered as a very important
Technique for beginning the game, so the accuracy of serve is needed. The cognitive specific imagery program can enhance the serving performance for which the 6-week training is sufficient an enhancement (Poompin, Chirathammawat, Bhungobs, & Bhasavanija, 2015). This study aimed to examine whether university level athletes’ serving accuracy was higher after sepaktakraw serving skill imagery training than baseline.

**Method**

**Participants**
Participants were 24 Thai athletes (Male = 12, Female = 12) of Ramkhamhaeng University who were serving position players, the age range of 18 to 20 years old (19.05±.11). They were randomised and divided into two groups; Group 1 was assigned to practice as following the commonly used programme, and Group 2 was assigned to practice a serving skill imagery training programme together with a commonly used programme.

**Tools**
1) Sepaktakraw serving accuracy test (Poompin et al, 2015)
2) The imagery training programme was created as a cognitive specific imagery lasting approximately 10 minutes per day, 5 days per week, for 8 weeks.

**Procedures**
I seek approval from the Ramkhamhaeng University Research Committee. This study was prepared: 1) Sepaktakraw serving accuracy test (Poompin et al, 2015), 2) introductory information and consent form, and 3) the imagery training programme was created and proved by five psychologists. At baseline test, participants were randomized by testing their serving accuracy, and making an array of highest to lowest score, and then dividing them into two groups; Group 1 was assigned to practice as following the commonly used programme, and Group 2 was assigned to practice a serving skill imagery training programme together with a commonly used programme. The imagery intervention lasted approximately 10 minutes per day, 5 days per week, for 8 weeks. At Week 4 and Week 8, participants were retested their serving accuracy again. At the end of the Week8 test, all participants were thanked for intentionally involving in this study.

**Data Analysis**
The serving accuracy data were collected and compared between at baseline, after 4-week and 8-week trainings, using the Paired t-test for comparison within and between groups.

**RESULTS**
Table 1 Mean and Standard Deviation of Serving Accuracy of Control and Experimental Groups

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Con_Baseline</td>
<td>2.5833</td>
<td>12</td>
<td>.51493</td>
<td>.14865</td>
</tr>
<tr>
<td>Ex_Baseline</td>
<td>2.6667</td>
<td>12</td>
<td>.49237</td>
<td>.14213</td>
</tr>
<tr>
<td>Pair 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Con_Week4</td>
<td>2.9167</td>
<td>12</td>
<td>.66856</td>
<td>.19300</td>
</tr>
<tr>
<td>Ex_Week4</td>
<td>3.5833</td>
<td>12</td>
<td>.79296</td>
<td>.22891</td>
</tr>
<tr>
<td>Pair 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Con_Week8</td>
<td>3.0833</td>
<td>12</td>
<td>.51493</td>
<td>.14865</td>
</tr>
<tr>
<td>Ex_Week8</td>
<td>4.3333</td>
<td>12</td>
<td>.65134</td>
<td>.18803</td>
</tr>
</tbody>
</table>

Table 1 shows that serving accuracies of control group (M = 2.58) and experimental group (M = 2.66) had a little bit differences at baseline test, as well as of control group (M = 2.91) at Week 4 was increased but of experimental group (M = 3.58) was higher, and at Week 8,
serving accuracies of control group (M = 3.08) was higher than at baseline and at Week 4, also, of experimental group (M = 4.33) was higher than at baseline and at Week 4 but higher than of control group at all test sessions.

Table 2 Comparison of Serving Accuracies between Control Group and Experimental Group

<table>
<thead>
<tr>
<th></th>
<th>Paired Differences</th>
<th>t</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair 1</td>
<td>Con_Baseline - Ex_Baseline</td>
<td>-.08333</td>
<td>.51493</td>
<td>-.561</td>
</tr>
<tr>
<td>Pair 2</td>
<td>Con_Week4 - Ex_Week4</td>
<td>-.66667</td>
<td>.98473</td>
<td>-2.345</td>
</tr>
<tr>
<td>Pair 3</td>
<td>Con_Week8 - Ex_Week8</td>
<td>-1.25000</td>
<td>.75378</td>
<td>-5.745</td>
</tr>
</tbody>
</table>

*p<.05

Table 2 shows that at baseline, there was no significant difference of serving accuracy between groups (t = -.56, p > .05). At Week 4, there was significant difference between groups (t = -2.34, p < .05) in which experimental group made higher serving accuracy (M = .083) than control group. Also, at Week 8, there was significant difference between groups (t = -5.74, p < .05) in which experimental group produced higher serving accuracy (M = .753) than control group.

Table 3 Mean and Standard Deviation of Serving Accuracy within Control Group

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td>Con_Baseline</td>
<td>2.5833</td>
<td>12</td>
<td>.51493</td>
</tr>
<tr>
<td></td>
<td>Con_Week4</td>
<td>2.9167</td>
<td>12</td>
<td>.66856</td>
</tr>
<tr>
<td>Pair 2</td>
<td>Con_Week4</td>
<td>2.9167</td>
<td>12</td>
<td>.66856</td>
</tr>
<tr>
<td></td>
<td>Con_Week8</td>
<td>3.0833</td>
<td>12</td>
<td>.51493</td>
</tr>
<tr>
<td>Pair 3</td>
<td>Con_Baseline</td>
<td>2.5833</td>
<td>12</td>
<td>.51493</td>
</tr>
<tr>
<td></td>
<td>Con_Week8</td>
<td>3.0833</td>
<td>12</td>
<td>.51493</td>
</tr>
</tbody>
</table>

Table 3 shows that serving accuracies at baseline of control group (M = 2.58) was higher than at Week 4 (M = 2.91), as well as at Week 4 (M = 2.91) was higher than at Week 8 (M = 3.08), and at Week 8 was higher than at baseline (M = 2.58).

Table 4 Comparison of Serving Accuracies within Control Group

<table>
<thead>
<tr>
<th></th>
<th>Paired Differences</th>
<th>t</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair 1</td>
<td>Con_Baseline - Con_Week4</td>
<td>-.33333</td>
<td>.65134</td>
<td>-1.773</td>
</tr>
<tr>
<td>Pair 2</td>
<td>Con_Week4 - Con_Week8</td>
<td>-.16667</td>
<td>.38925</td>
<td>-1.483</td>
</tr>
<tr>
<td>Pair 3</td>
<td>Con_Baseline - Con_Week8</td>
<td>-.50000</td>
<td>.52223</td>
<td>-3.317</td>
</tr>
</tbody>
</table>

*p<.05

Table 4 shows that control group had no significant difference of serving accuracy between at baseline and at Week 4 (t = -1.77, p > .05), as well as at Week 4 and at Week 8 (t = -1.48, p < .05). Moreover, there was significant difference of serving accuracy between at baseline and at Week 8 (t = -.31, p < .05) in which serving accuracy at Week 8 was higher than at baseline (M = .500) and at Week 4 (M = .166).
Table 5 Mean and Standard Deviation of Serving Accuracy within Experimental Group

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td>Ex_Baseline</td>
<td>2.6667</td>
<td>12</td>
<td>.49237</td>
</tr>
<tr>
<td></td>
<td>Ex_Week4</td>
<td>3.5833</td>
<td>12</td>
<td>.79296</td>
</tr>
<tr>
<td>Pair 2</td>
<td>Ex_Week4</td>
<td>3.5833</td>
<td>12</td>
<td>.79296</td>
</tr>
<tr>
<td></td>
<td>Ex_Week8</td>
<td>4.3333</td>
<td>12</td>
<td>.65134</td>
</tr>
<tr>
<td>Pair 3</td>
<td>Ex_Baseline</td>
<td>2.6667</td>
<td>12</td>
<td>.49237</td>
</tr>
<tr>
<td></td>
<td>Ex_Week8</td>
<td>4.3333</td>
<td>12</td>
<td>.65134</td>
</tr>
</tbody>
</table>

Table 5 shows that serving accuracies at baseline of experimental group (M = 2.66) was higher than at Week 4 (M = 3.58), as well as at Week 4 (M = 3.58) was higher than at Week 8 (M = 4.33), and at Week 8 was higher than at baseline (M = 2.66).

Table 6 Comparison of Serving Accuracies within Experimental Group

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Paired Differences</th>
<th>t</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex_Baseline - Ex_Week4</td>
<td>-0.91667</td>
<td>.79296</td>
<td>-4.005</td>
<td>.002*</td>
</tr>
<tr>
<td>Ex_Week4 - Ex_Week8</td>
<td>-0.75000</td>
<td>.75378</td>
<td>-3.447</td>
<td>.005*</td>
</tr>
<tr>
<td>Ex_Baseline - Ex_Week8</td>
<td>-1.66667</td>
<td>.65134</td>
<td>-8.864</td>
<td>.000*</td>
</tr>
</tbody>
</table>

*p<.05

Table 6 shows that serving accuracies between all test sessions were significant differences in experimental group (p < .05) in which serving accuracy at Week 8 was higher than at baseline (M = 1.666) and at Week 4 (M = .750).

CONCLUSION

This study results in; 1) There was no significant difference of serving accuracy at baseline between control group and experimental group, 2) after 8-week imagery training, there was no statistically significant difference within control group, and there was statistically significant difference within experimental group, and 3) there was statistically significant difference between control and experimental groups after training at Week 4, and also at Week 8. The results of this study are similar to previous studies are that an imagery training programme on sport performance can be useful for enhancing the sport skills (Cherchang, Vongjaturapat, Anusananan, & Bhasavanija, 2014; Bhasavanija, & Morris, 2013). This study suggests that imagery, as a mental technique, should be applied for sport coaching in order to help athletes to succeed their games.

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Oral Presenter 1

The Effect of 8 Weeks Core Training on Technical characteristics of Malaysian Rhythmic Gymnasts
Soheyla Nazari, Lim Boon Hooi
Sport Center, University of Malaya, Malaysia

Abstract
Rhythmic Gymnastics (RG) is a sporting modality that has been technically developing through alterations of the punctuation code and adaptations in the competition levels, of age group and others. More and more, for those that long for high results, the course becomes more difficult.
The aim: The objective of this study was to compare the significance differences of technical characteristics between control and experimental groups before and after Intervention program.
The method: The current study is a quasi-experimental study with pre-post and 4 week follow-up test, in which participants were randomly selected to receive the training program (intervention group). Participants in the control group were exposed to the same conditions as intervention group expect for the core training plan. Pre- and post-tests were performed in both intervention and control groups before and after the training program (8 weeks) as well as 4 weeks later for the follow-up test. For this purpose of study 40 participants were randomly divided to intervention (n=20) and control (n=20) groups using a random sampling with a draw session.
Results: The result revealed that the difference of the technical characteristic’s score between control and intervention in pre-test was not significant (∆mean=0.04, p=0.60) while the differences between intervention and control groups was significant in post-test1 (∆mean=0.23, P<0.001) with large effect (η²=0.32) and post-test2 (∆mean=0.25, P<0.001) and effect size was large (η²=0.35). Therefore, the null hypothesis was rejected and it can be concluded that the intervention program was effective on technical characteristics in intervention group.
Conclusion: The results of this research showed the core training program as the interventional plan had the positive effects on all the participants’ technical characteristics assessed in the current study. Results of the follow up test also showed that doing the exercises in mid-time improved the participants’ performance continually.
Keywords: Rhythmic gymnastics (RG), Core training

Oral Presenter 2

Perceived Sport Commitment among Badminton Players in Malaysia
Arthur Ling Wei, Ling¹, Vincent Teo Eng Wah¹, Chin Ngien Siong²
¹University of Malaya, Kuala Lumpur, Malaysia
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Abstract
Objectives: The purpose of this study is to examine the differences in sports commitment and reasons that motivate badminton players across gender and age groups.
Methods: The participants were 233 badminton players (n=92 males, n=142 females) aged 18 to 65 years. They completed the Sport Commitment Questionnaire-2 (Scanlan, Chow, 164
Sousa, Scanlan & Knifsend, 2016) on a 5-point Likert scale and descriptives items. The independent samples t-test and one-way ANOVA were conducted to examine the differences in sports commitment among gender and age groups. **Results:** The results showed that sport enjoyment represent the main reason contributing to the commitment of badminton players. The independent sample t-test and one-way ANOVA showed that there were no significant differences in commitment across gender and age groups. **Discussion:** The findings revealed the necessity to identify the factors that underpin sport commitment in badminton and understand the needs of the players in order to remain committed to badminton.

**Oral Presenter 3**

**The Effect of Music Rhythms on Treadmills Exercising Time Spending**

_Wannee Jermsuravong and Warasin Rodjanawongkarn_  
Silpakorn University, Thailand

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**Abstract**

**Purpose:** This research aims to study and to compare the speeds of music effecting on treadmill exercising time spending.  
**Method:** This research applied experimental research method. Participants were 10 male volunteers who were healthy and be willing to participate in the experiment. The samples were tested in 3 rounds, First round exercise on treadmill with listening to music with 120-140 beats per minute, second round 150-170 beats per minute and third round exercise with no music. The data were analyzed by one-way ANOVA measure with repeated and bonferroni to pos hoc test. (significantly difference level .05.)  
**Results:** The results showed mean and standard deviation of times to exercise 120-140 minutes per minute music, 150-170 minutes per minute and no music were 13.89±0.94, 12.96±0.80 and 11.67±0.95 minutes. The results showed exercise with music rhythm 120-140 beats per minute was exercised longer than 150-170 beats per minute and no music. One way analyzes of variance between exercise duration, with the music rhythms 120-140 beats per minute, 150-170 beats per minute and no music were statistically significant differences at the .05 level. Post hoc test showed that significant difference between music with 120-140 beat per minute and 150-170 beats per minute, and no music at the .05 level. The music 150-170 beat per minute was significant difference between no music at .05 level too.  
**Conclusion:** Music can help to keep you exercise too longer. The rhythm of the music influences on the length of the exercise. So if you want to motivate yourself to exercise, you can workout with the music at speeds of 120-140 beats per minute.
Abstract
The purpose of this study was to investigate the mediating roles of the coach-athlete relationship and basic psychological needs on the relationships between perceived coaching behaviors and athletes’ psychological well- and ill-being. A total of 337 Korean middle-high school student-athletes, whose ages ranged from 13 to 18 years old, took part in this study. They were active members of sport teams including swimming, water polo, fencing, track and field, and archery. SPSS 22.0 and Amos 22.0 were used to calculate descriptive statistics and to conduct structural equation modeling (SEM). The bootstrap technique was used to test the mediation effect. 5,000 bootstrap samples were requested. A measurement model was conducted and the fit was acceptable, (405)=849.03 (p<.001), CFI=.94, TLI=.93, and RMSEA=.06. The structural model fit was also acceptable, (415)=945.24 (p<.001), CFI=.94, TLI=.93, and RMSEA=.05. As shown in the model, two exogenous variables (i.e., autonomy-supportive coaching behaviors and controlling coaching) had a significant correlation. There was a significant pathway (β=.18, p<.05) from autonomy-supportive coaching behaviors to psychological well-being, whereas there was a significant pathway (β=.58, p<.001) from controlling coaching styles to psychological ill-being. There were no direct pathways from both coaching styles to three basic psychological needs. The coach-athlete relationship significantly predicted all three basic psychological needs and psychological well-being (β=.33, p<.001). All three needs were significantly predictive of psychological well-being, whereas only autonomy was predictive of ill-being. Bias corrected (BC) bootstrap confidence interval estimates indicated significant indirect effects in the model. The results indicated that the coach-athlete relationship was a key variable to predict athlete’s feelings of psychological needs and in turn psychological well- and ill-being.

Oral Presenter 5
Secondary school students’ perceived cost value and motivational climate in Physical Education
Ting Pei Yi, Chin Ngien Siong, Lee Sing Ching, Candrawati Binti Hj Ibrahim
Institute of Teacher Education Tun Abdul Razak Campus
Kota Samarahan, Sarawak, Malaysia

Abstract
Purpose: Participating in physical education (PE) requires motivational processes in the form of cost value and motivational climate which can influence one’s performance in PE. This study examined the secondary school students’ cost value of task effort, outside effort, lost value alternatives, emotional cost and task-and ego-motivational climate among gender, age and race in Physical Education.
Methods: The participants were 312 secondary school students aged 16 and 17 years (16.31 ± .46). They responded to the questionnaire on perceived cost measuring task effort
cost, outside effort cost, loss of valued alternatives cost, emotional cost and task-and ego-motivational climate. The independent sample t-test and one-way ANOVA were conducted to examine the differences in the motivational variables among gender, age groups and race.

**Results:** The independent sample t-test results showed that there were no significant difference between male and female students in the task effort cost, outside effort cost, loss of valued alternatives cost and ego-motivational climate. On the contrary, there was significant differences in emotional cost, \( t(310) = 2.07, p = .03 \) and task-motivational climate, \( t(310) = 2.22, p = .02 \) among male and female students. The independent samples t-test also revealed that there were significant differences in task effort cost, \( t(310) = -2.98, p = .003 \); outside effort cost, \( t(310) = 3.00, p = .003 \); lost valued alternatives cost, \( t(310) = -2.51, p = .013 \); emotional cost, \( t(310) = -5.213, p = .00 \) and task-motivational climate, \( t(310) = 4.73, p = .000 \) among the different age groups. Conversely, the t-test revealed no significant difference between male and female students in ego-motivational climate, \( t(310) = .34, p = .72 \). The one-way ANOVA revealed that there were no significant differences among the races on task effort cost, \( F(4, 307) = .383, p = .821 \); outside effort cost, \( F(4, 307) = 2.372, p = .052 \); loss of valued alternatives cost, \( F(4, 307) = .616, p = .651 \); emotional cost, \( F(4, 307) = 1.868, p = .116 \). On the contrary, there was a significant difference among races in task-motivationalclimate, \( F(4, 307) = 5.872, p = .000 \) but no significant differences among races in ego-motivational climate, \( F(4, 307) = 1.222, p = .301 \). Post hoc tests revealed that significant differences exist between Bidayuh \( (5.53 \pm 1.08), p = .007 \) and Chinese \( (4.80 \pm 1.01, p = .007) \) in task-motivational climate. No significant results were found among the remaining races.

**Conclusion:** It is important to enhance the interest, attainment and utility values inherent in task accomplishment and efforts based on a task-motivational climate to enhance the students to sustain regular, lifelong physical activity in PE. In addition, it is necessary to anticipate what costs are likely to most salient in PE and seek ways to ameliorate one’s attitudes towards PE (Anderson, 2000).

**Oral Presenter 6**

**The Effectiveness of Psychological Skills Training (PST) Program on Netball Shooting Performance**

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50603 Lembah Pantai, Kuala Lumpur, Malaysia

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**Abstract**

Few previous findings addressed the topic of this study to investigate the effect of Psychological Skills Training (PST) Program on netball shooting performance. The objective of this study was to determine the effectiveness of an 8-week intervention: combination of diaphragmatic breathing (DB) and imagery, plus physical practice (PP) - Group 1 (G1), combination of DB and self-talk (ST), plus PP – Group 2 (G2) and control group – Group 3 (G3) on netball shooting performance. The subjects who achieved a criterion of equal to or less than 36 of the VMIQ-2 subscales were recruited as G1 \( (n=16) \) whereas, the remaining subjects were equally divided randomly into G2 \( (n=15) \) and G3 \( (n=15) \). A SPANOVA was conducted to assess the impact of two different treatment groups and one control group on netball shooting score, across the two time periods (pre-intervention and post-intervention). There was a significant interaction between groups and time (Wilks Lambda = .612, \( F(2,43)=13.61, p=<.0001 \)). There was also a substantial main effect for time, (Wilks Lambda
= .515, F(1,43)=40.507, p < .001, partial eta squared=.544) with all groups showing an increment in shooting performance score across the two time periods. The result also showed that the main effect comparing the two treatment groups and a control group was significant, F(1,43 = 183.445, p < .0001, partial eta squared =. 354). The results indicated that netballers of different skill used of PST, either G1 or G2 are found to improve the netball shooting performance. It was also showed that G1 has better netball shooting performance rather than G2 and G3. Thus, principles and practical applications of the most basic psychological strategies can be taught in a relative short period but modification should be considered to put some fun and enjoyment element in the program.

Oral Presenter 7
Effects of Synchronous Music on Rating Perceived Exertion and Running Performance in Hot and Humid Conditions
Luke Nikol, Garry Kuan, Marilyn Ong
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Abstract
Running in high heat and humidity increases psychophysiological strain, which typically impairs running performance, whereas listening to synchronous music has been shown to provide psychophysiological benefits, which may enhance running performance. The present randomized crossover study examined effects of listening to synchronous music on psychophysiological parameters and running performance in hot and humid conditions. Twelve male runners (21.7 ± 2.2 y; 166.17 ± 7.18 cm; 60.32 ± 9.52 kg; 59.29 ± 5.95 ml.kg⁻¹.min⁻¹) completed two running trials in simulated conditions (31°C and 70% humidity) with and without synchronous music. Participants ran on a treadmill inside a heat chamber for 60 min at 60% VO₂max and continued to run to exhaustion at 80% VO₂max. Time-to-exhaustion under the synchronous music condition was 66.59% longer (mean = 376.5s vs 226.0s, p < .05, d = 0.63) compared to the no music condition. RPE was significantly lower for the synchronous music condition at each time point (15, 30, 45, 60 min) of the steady state portion of the running trials. Findings suggest that listening to synchronous music is beneficial to running performance and perceived exertion in hot and humid conditions.

Oral Presenter 8
The Relationship between Coaches’ Leadership Behaviour and Team Cohesion of Athletes
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Taipei, Taiwan

Abstract
Purpose: In the process of athletic training and competing, a coach’s leadership is one of the primary cause in affecting team cohesion of athletes. Coaches play a complex and diverse role in the team, and their leadership behavior and style could be the key to affect
the athletics' performance and outcome of the game. The purpose of the study was to understand the effect of coach’s leadership and team cohesion of athletes by reviewing literature.

**Methods:** By searched CEPS Archives between 2010 to 2017 from Taiwan Journals by using the keywords “coaches’, leadership behavior”, “team cohesion” and identified 10 articles to summarize and analyze the contents.

**Results:** The results were as follows: 1) The athletes’ team cohesion by coaches’ leading behavior have a significant statistical effect. 2) Athletes will have higher team cohesion when they feel more “training and guiding behavior”, “democratic behavior”, “concern behavior” and “reward behavior”. 3) In coaches’ behavior, the “authoritative behavior” is not significantly related to team cohesion.

**Conclusion:** It is an indisputable fact that coaches’ behavior has an important influence on athletes and teams, coaches should be making more efforts to enhance their positive leadership behavior to increase the effectiveness of team targets and development of sports performance.

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**Oral Presenter 9**

**The Validation of Sport Spectator Identification Scale in Thai Version (SSIS\textsubscript{tv})**

Sarawut KUSUMP\textsuperscript{1}, Naruepon VONGJATURAPAT\textsuperscript{2}, Saksan TONGKHAMBANCHONG\textsuperscript{3}

\textsuperscript{1}Sport Authority of Thailand Region 3 Center, \textsuperscript{2}Faculty of Sport Science, \textsuperscript{3}Faculty of Education, Burapha University, Thailand

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**Abstract**

**Purpose:** The purpose of this study was to validate the Sport Spectator Identification Scale: SSIS into Thai version.

**Method:** In this study, there are 408 volunteering participants of Thai football spectators (259 male and 149 female participants) with the average age of 26 ± 8.3 years old (between 18 – 60 years). Developed by Wann & Branscombe (1993), SSIS consists of 7 items and total reliability is .90. Brislin (1986)’s Back translation technique was employed to ensure its content reliability and confirmatory factor analysis for its construct validity.

**Results:** The result of this study indicates that the Thai versions of SSIS are still appropriated with Thai population group. The construct validity is acceptably fit well with the data ($\chi^2 = 3.308$, $df = 4$, $p = 0.508$, $\chi^2/df = 0.827$, RMSEA = 0.000, NFI = 0.999, NNFI = 1.001, CFI = 1.000, RMR = 0.006, SRMR = 0.006, GFI =0.998, AGFI = 0.984, PGFI = 0.543). The overall reliability of the test, as indicated by coefficient alpha, is 0.93. This Thai version of SSIS is valid, reliable and consistent with the original one.

**Conclusion:** In conclusion, this result indicates that a Thai version of SSIS is acceptable and suitable to be used with Thai population.
Oral Presenter 10
The Effect of PETTLEP Imagery in Open and Close Skill of Badminton.
Apanchanit Siripatt, Suwat Luangon, Tavipup Puengsoonthonsirimas, Suebsai Boonveerabut
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Abstract
Badminton serves (BS) and returning badminton serve (RBS) are very important in the badminton game, that very fast and a lot of pressure, so new player hard to control BS and RBS. BS is a closed skill. They are distraction free and are given the opportunity to serve the shuttlecock by uninterrupted. RBS is an open skill that takes place in a dynamic and changing environment. Player trying to move around the court for return serve and multiple other variables that could affect them. The use of sports psychology techniques is an alternative for help new player to control their abilities. This study explores the effect of PETTLEP imagery in open and close skill of badminton sport.

Eighty male who no experience in badminton, sport imagery and competition, 40 participated in BS groups and 40 participated in RBS groups. The BS and RBS accuracy test were conducted. The data collecting from BS and RBS accuracy test at before training, after week 4 and week 8 of participating the program. Mean, SD, t-test, one-way ANOVA with repeated measures, and Bonferroni were used to analyze the data significant at .05 level. The results reveal that, the mean score of BS after 8th weeks was significantly increased when compared with the 4th weeks and before training for both groups (control and experimental group). There were statistically significant differences within groups between week 8, 4 and pre-test. There were significant differences within groups of RBS accuracy mean score between prior, after 4th and 8th week.

There was no significant difference between group 1 and 2 of BS and RBS. However, the group practiced badminton with PETTLEP Imagery model training showed better results than those who practiced the badminton only. PETTLEP showed a tendency to improve scores for open and closed skill in badminton beginner.

Oral Presenter 11
The Effect of Adding Music during Imagery Training in Enhancing the Performance of Kelantan Tenpin Bowling Player
Siti Nur Syafiqah Rosli, Garry Kuan
Exercise & Sports Science Programme, School of Health Science, Universiti Sains Malaysia, Malaysia.

Abstract
Numerous studies found music has a strong relationship with athletes’ sporting performance. Thus, this study is conducted to determine the effectiveness of adding music during imagery training in enhancing the performance of Kelantan’s tenpin bowlers. Total of 14 participants with 10 male and 4 female (age: 12.86±1.83) volunteered to participate in this study. The study employed a cross-over study design with two research conditions: Imagery training only (IT), and Music and imagery training (MIT). For IT, the participants listened to imagery training audio for 12 sessions and following with 1 week of the resting period. Then, continued with imagery training audio adding with music for the same session. Participants
were required to perform pre and post-session of bowling shots before and after imagery training session. Results show that there was a significant difference between pre and post session of bowling shots for both imagery training (p < 0.05) where mean for imagery training with music is slightly higher rather than imagery training without music. Based on the result obtained, it can be concluded that in the present study, by adding music to the imagery training, the participants performed better.

Oral Presenter 12
Effects of PETTLEP and NLP-PETTLEP Imagery Scripts on Self-Confidence Score among Novice Archers

Meisam Savaradelvar, Garry Kuan, Tony Morris

1 Exercise and Sports Science, School of Health Sciences, Universiti Sains Malaysia.
2 Sport Science Unit, School of Medical Sciences, Universiti Sains Malaysia.
3 College of Sports and Exercise Science, and ISEAL, Victoria University, Australia.

Abstract
Neuro-Linguistic Programming (NLP) is a multidisciplinary psychology model that seeks the interaction between mind and language. NLP emphasis on information processing and individuals’ understanding of their mental representations. From an applied point of view, because there is a positive correlation between imagery, self-confidence, and sport performance, it should be helpful to examine the efficacy of NLP on the self-confidence variable of the participants and compare its effect with PETTLEP model as a well-investigated imagery model. We employed a pre-test-intervention-post-test design to evaluate the imagery interventions’ effects on novice archers’ performance. Based on the obtained data, the PETTLEP imagery was lower in self-confidence score compared to NLP-PETTLEP (M = 68.42, SD = 11.39; M = 70.13, SD = 12.14), independent sample t-test showed no significant change in both groups (t_{375} = 25; p = .711, eta = 0.12). Considering the participants were absolutely novice archers, it seems that the adopted imagery interventions, specifically the NLP-PETTLEP one, involved them with additional complex cognitive skills instead of merely affecting their confidence level.
Oral Presenter 13

Confirmatory Factor Analysis of Decisional Balance and Processes of Change Scale Among Undergraduate Students in Health Campus, Universiti Sains Malaysia (USM)

Liu Kien Ting\textsuperscript{1}, Garry Kuan\textsuperscript{2}, Yee Cheng Kueh\textsuperscript{1}, Wan Nor Arifin\textsuperscript{1}, Youngho Kim\textsuperscript{3}

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\textsuperscript{3}Department of Sport and Health Science, Seoul National University of Science and Technology, Seoul, Korea.

Abstract

Introduction: Decisional balance is the perceived of positive and negative aspects that are related to individual’s behavioural changes. Processes of change are techniques and strategies that people use as they progress through different stages of change over time. Both scales are linked with the stages of change where it is used to understand how people change a problem behaviour from pre-contemplation to maintenance. Purpose: The aim of this study was to determine the validity and reliability of decisional balance and processes of change scales for exercise among undergraduate’s students in USM using the Confirmatory Factor Analysis. Method: A cross-sectional study was carried out to test among USM undergraduate students who took part in the co-curriculum. By using purposive sampling, students were informed that their participation is entirely voluntarily to fill in self-administered 10-items for decisional balance and 30-items questionnaire processes of change using 5-point Likert scale before the co-curriculum session. The questionnaire was collected after the co-curriculum session ended. Data were analysed using Mplus version 8 software. Results: A total of 300 students participated in this study. Majority of the students were female (79.3%), and were Malay (67.3%) with the mean of 2.74 times exercise per week, and mean of 43.37 minutes exercise per session. For measurement model assessment, decisional balance scale showed a good fit index: RMSEA= 0.042 (90% CI= 0.013, 0.064), CFI= 0.981, TLI= 0.973, SRMR=0.054. Meanwhile processes of change scale showed a good fit index: RMSEA= 0.041 (90% CI= 0.034, 0.048), CFI= 0.946, TLI= 0.935, SRMR=0.052. Composite reliability showed a good construct reliability of both scales ranged from 0.6 to 0.9. Conclusion: The findings suggest that decisional balance and processes of change scale is valid and reliable to test Malaysian undergraduate students.
Oral Presenter 14

Enhancing Self-efficacy Level through Pre-Exposure Programme (PEP) Prior to Clinical Placement among Physiotherapy Students of Asia Metropolitan College, Kuching

Cindy Lee Chia Yin, Teng Kie Yin
Asia Metropolitan College Kuching
Institut Pendidikan Guru Kampus Tun Abdul Razak

Abstract
Self-efficacy in healthcare education has been emphasized more in recent years. The transition from theoretical knowledge to clinical practice among healthcare students is a gap to cross of which high perceived level of self-efficacy beliefs may assist with the implementation of a pre-exposure programme (PEP) in a college set up. The purpose of this study is to identify the self-efficacy level of 14 semester 5 students (Year 2) of Asia Metropolitan College Kuching pre and post PEP, prior to their clinical placement in Year 3. Each of them was to complete a set of questionnaire consisting of 20-items on PTstuCSES before and after the programme. The findings from Wilcoxon T test indicated that there is no significant differences in self-efficacy level among the respondents in pre and post PEP (T=32.00, p>.05). The implications of practice were further discussed.

Oral Presenter 15

The Effects of Football Coach’s Coaching Language on Football Player’s Team Cohesion and Exercise Satisfaction

Yongjun Yoo, Kooin Jung
Korea National University of Education, Korea

Abstract
The purpose of this study was to find out the effects of coaching language of coach on the team cohesiveness of the soccer players and the exercise satisfaction, difference according to age and career. For this study, questionnaires were initially distributed to 805 national soccer players. Among them, total 798 questionnaires were finally used in this study (middle school: 278, high school: 218, university: 302). The data were analyzed using SPSS 21 and AMOS 21 programs. The t-test and ANOVA were conducted to determine whether the coaching language, team cohesion, and exercise satisfaction differed according to age, career, Correlation analysis and multiple regression analysis were conducted to confirm the effect on team cohesion and exercise satisfaction. The results of this study are as follows. First, coaching language, team cohesiveness, and exercise satisfaction differed according to age, athlete career, and competition. Second, coaching language, team cohesion, and exercise satisfaction were correlated. Third, in the case of junior high school students, the coaching language of the leader, the question language, the positive language, the management language, the question language of the coaching language for the high school students, the management language. Respectively. Finally, in the case of junior high school athletes, explanation language, question language, coaching language, positive language, coaching language which is coaching language, affirmative language, negative language, management language were found to affect player satisfaction. These results demonstrate the importance of soccer leaders’ coaching language and provide meaningful implications for coaching language in effective soccer teaching methods.
Section 4

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Poster Presenter 1

The Relationships between Emotional Intelligence and Sport Psychological Skills among Male Rugby Players

Ming-Chen Yang¹, Ko-Hsin Chang²

¹National Taiwan Sport University
²Chinese Culture University

Abstract
The purpose of this study was to compare the differences of Rugby players’ sport psychological skill and emotional intelligence; and examine the relationship between sport psychological skill and emotional intelligence. We sampled 318 rugby players and administered with “Athlete psychological skills scale” and “emotional intelligence scale”. Result showed there is no significant difference between skill levels and psychological skills abilities but a significant difference on self-understanding of emotions, peaking under pressure and coping with adversity, motivation, coachability, and psychological skill total score. Pearson correlation analyses found psychological skills positively correlated with all dimensions of emotional intelligence; and motivation positively predicted emotional intelligence (p<.05). We concluded that psychological skills training may help athletes to enhance motivation, coping with stress and affect athletes' emotional intelligence.

Poster Presenter 2

Relationship Among Social Physique Anxiety, Perfectionism, and Exercise Dependence

Sean H. Liu, Hong-Yu Liu
Chinese Cultural University, Taiwan

Abstract
This study aim to examine the relationship among social physique anxiety, perfectionism, and exercise dependence, then try to figure out what maybe the cause of exercise dependence. One hundred and sixty-six regular exerciser (males = 78, female = 88) with age 27.08 (±6.95) years participated In this study. An independent t-test indicated that there was no difference between the individual exercise in high versus low physique exposure environments in social physique anxiety, perfectionism, and exercise dependence. Further Person Product-Moment Correlation Coefficient show and Stepwise Regression analysis found that perfectionism positively predicted exercise dependence, but social physique anxiety failed to predict exercise dependence. Results were discussed in terms of practical application and future research.
Abstract

Purpose: This study was purposed to investigate the impact of involvement the Boccia training on the improvement of self-confidence in children with learning disability.

Methods: A grade four of special education student with learning disability from Taipei, Taiwan were participated in this study. The 40-minute Boccia training courses was conducted twice a week for 8 weeks. The self-confidence was collected through observation and interviews before and after training intervention in the regular classes.

Results: Eight-week Boccia training improved the self-confidence of learning disabilities student and thus ameliorated their learning performance. The interviewed teachers also held a positive attitude toward improving students' self-confidence.

Conclusion: Students with learning disability became less confidential performing due to learning, however, these were restored after eight weeks of Boccia training. Special educational student became more confidence and willing to express their opinions, suggesting that Boccia training would be an alternative choice for improvement of self-confidence in children with learning disabilities.

Abstract

Purpose: In the sports competition, a lot of factors that affect athletic performance. When athletes’ conditions of ability, physical strength and skill are about the same, psychological status has become the key factor in victory or defeat. Therefore, mental skills training has become one of the important skills of coaches and players in training.

Methods: The method of the study was literature review by analyzing 10 journal articles form 2001-2017 published in Taiwan, in order to discuss the effect of mental skills training on sports performance.

Results: The results indicated that: 1) No matter what kind of sports, the present findings show that sports performance had a positive effect on mental skills training. 2) The highest scores of “the mental technical ability for athlete measures the form” of different sports are different. This indicates that all sports have their own unique trait.

Conclusion: Different sports on psychological skills training will have different results and responses. Therefore, athletes should find out their own way to understand and establish psychological skills training cognitive and training methods.
**Poster Presenter 5**

**Discussion of Morality in Sports**

Hsiao-Yung Chen, Kuang-Hsien Huang  
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Taipei, Taiwan  

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**Abstract**

"Morality" is usually used to evaluate the appropriateness of people's characters or behaviors. "Sportsmanship" is used to evaluate athletes both inside and outside the stadium. For quite some time, the promoters of sports have asserted that participating in sports is beneficial for the development of morality and society. However, many commentators also suggested that the sport would hinder the development of the characters to refute the idea of "Games create characters". The main purpose of this paper was to explore and review the relevant researches on sportsmanship. **Method**: Literature review. We searched CEPS Archives between 1994 to 2016 from Taiwan Journals and identified 8 articles to summarize and analyze the contents. **Results**: according to the literature review found: 1. The influence of sports values on sports morals. 2. The relationship between goal orientation and sportsmanship. 3. The relationship between sportsmanship and the sportsmanship development in sports and the related issues. **Conclusion**: From various studies, it has been found that morals and value orientation, moral reasoning, perceptual aggression legitimacy and sports behaviors, personal differences, and social background have something to do with moral development. The main purpose of this study is to provide readers with more understanding of sport ethics and to provide future research directions and references through literature review.

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**Poster Presenter 6**

**The Relationships of Sports Motivation and Enthusiasm by Badminton Participants**

Hui-Lin Chen, Chung-Ju Huang  
Graduate Institute of Sport Pedagogy, University of Taipei  
Taipei, Taiwan  

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**Abstract**

**Purpose**: Badminton is one of the most popular recreational sports in Taiwan. The purpose of this paper was to examine the relationships among sports motivation and sports enthusiasm by badminton participants. **Method**: Through the method of literature review, by search the keywords “leisure badminton”, “sports motivation” and “sports enthusiasm” to identify 10 articles to summarize and analyze the contents from 2010-2017. **Results**: Results found that: 1) most of the results show that there was a highly positive correlation between sports motivation and enthusiasm. 2) Sports enthusiasm was higher when sports motivation was higher, and sports enthusiasm and forced enthusiasts were the highest correlated with intrinsic motivation. **Conclusion**: According to the literature study found that participants of badminton can get both physical and psychological benefits as well as social interaction, thus participants can maintain their motivation and high enthusiasm to continuously join this activity.
Poster Presenter 7
Discussion on female athletes mental toughness
Yi-Chun Lin, Yen-Tzu Lin, Chung-Ju Huang
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Taipei, Taiwan

Abstract
Purpose: No matter the level of athletes, we all know that in addition to fundamental physical (technical and stamina), mental aspect is more important to athletes. Huang (2004) also pointed out that mental tenacity refers to the psychological characteristics of an individual not easily giving in during sports competition, even when the individual is under duress. Mental tenacity mainly consists of three aspects: active struggle, resistance to stress, and ability to enduring pain, especially in maintaining self control over determination, concentration, self-confidence, and managing pressure, which will result in a more consistent and stable condition than its competitors (Jones, Hanton, & Connaughton, 2002). The purpose of this study was to understand the issues and difficulties of mental tenacity affecting the athletes during competitions and training, and how to resolve these issues.
Methods: This study recruits two female basketball players (one is an Elite Collegiate basketball player, one is a WSBL professional basketball player, averaging over 10 years of basketball experience). A semi-structured interview was performed for the data collection regarding the three facets of mental tenacity constructed by Huang (2004).
Results: The result of the interview was then interpreted by using content analysis method. This study found that: players with high mental toughness are not easy to give up on the court and are more active when they are in an inferior position in seeking ways to win. As well, they are more focus in the key competitions in dealing with difficulties and problems. Lastly, during these situations, they are more able to tolerate pain is and fatigue.

Poster Presenter 8
The Role of Peer Leadership Behaviors on the Sources of Sport-Confidence
Meng-Yun Chen, Wen-Yi Wang
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Taipei, Taiwan

Abstract
Purpose: Enhancing athletes’ self-confidence brings positive effects on the performance. The two main sources of sport-confidence are coach and teammate, and the peer leadership behaviors have more influence on group cohesion. The purpose of this study was to investigate the role of peer leadership behavior on Sources of Sport-Confidence.
Method: Literature review. We analyzed 8 journal articles published in Airiti Library and EBSCO from 2006-2017. Results: It is suggested that 1. Leadership behaviors are sorted differently in the USA and in Taiwan and discussed in several studies. 2. The “task leadership”, “social leadership” and “personal talent” could positively predict sources of sport-confidence, and the results offered us to understand the influences of different peer leadership on sources of sport-confidence. 3.“Social support” may predict sport confidence-trait the most. 4. Peers may significantly have a more positive influence on individuals’ basic psychological need satisfaction than coaches, therefore the rising of the satisfaction could
help develop athletes’ sport confidence. Conclusion: It is suggested peer leadership behaviors could predict sport-confidence in a multidimensional way. The relationship of each dimension to sport-confidence could be investigated further in future studies.

**Poster Presenter 9**

The Investigation of Goal Orientation and Coping Strategies for Competitive Stress among Athletes

Pei-Cih You
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Taipei, Taiwan

**Abstract**

**Purpose:** Sports competition is well known for placing extremely high demands on athletes and coping strategies have a strong relationship to performance. Therefore, the purpose of this study was to investigate goal orientation of athletes on competition strategies by literature review. **Methods:** We analysed 6 journal articles published in CEPS Airiti Library by engine to investigate goal orientation of athletes on competition strategies and coping strategies for competitive stress among athletes. **Results:** It is suggested that 1) Working orientation is related to corresponding strategy of questions and emotion. 2) Stress treatment and adversity adjustment, work orientation as an effective predictor of the problem response strategy, work orientation is an effective predictor of affective response strategies. **Conclusion:** Sports target orientation is related to coping strategies for competitive stress among athletes. The points of sports target orientation is higher, the points of coping strategies for competitive stress among athletes is also higher. The meaning of success to an athlete is working hard and learning new skills. Athletes will feel more accomplished when success is under controlled.

**Poster Presenter 10**

The Relationships among Recreational Sport Satisfaction, Job Stress and Burnout

Po-Yu Chen, Tian-Lu Ke
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Taipei, Taiwan

**Abstract**

**Purpose:** Following the development and advancement of technical civilization and under the stressful busy life and working practices, people’s feeling to life stress and affection change with the transformation of the environment and result in adaptation disorder called “burnout”. The concept of leisure adjustment strategy, whose function is to moderate negative pressure and produce positive adjustment results to maintain physical and mental health, further points out that people should take leisure activities into consideration in response to various pressures of daily life. As a way to improve stress and physical and mental health, and the effect of leisure and adjustment has been confirmed. The main purpose of this study was to understand the relationships among recreational sports satisfaction, job stress, and burnout. **Methods:** By searched CEPS Archives between 2010
to 2017 from Taiwan Journals by using the keywords “job stress”, “burnout”, “Recreational Sports Satisfaction”, and identified 10 articles to summarize and analyze the contents.

**Results:** The results were as follows: 1) The job stress caused the negative influence on recreational sports satisfaction. 2) The recreational sports satisfaction caused the negative influence on job burnout. 3) The job stress caused positive influence on job burnout.

**Conclusion:** All government agencies should organize and take the initiative to promote leisure sports and provide recreational sports facilities to meet the needs of people's different leisure sports. It is suggested that people should bring leisure sports to life and recreational sports during leisure sports Satisfied with and then develop the concept of life-long sports and habits, to adjust the pressure and burnout.

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**Poster Presenter 11**

**The relationships among athlete's goal orientation and sports motivation in Taiwanese athletes**

Wei-Chi Kuo, Wen-Yi Wang

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Taipei, Taiwan

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**Abstract**

**Purpose:** Motivation is a complex phenomenon. Athletes might be motivated by intrinsic motivation and extrinsic motivation to keep themselves in training without interruption. The purpose of this study was to explore the relationships between athletes’ motivation for the sports and goal orientation in Taiwanese athletes.

**Methods:** We searched CEPS Archives in the past 10 years from Taiwan Journals by using the keywords “goal orientation” and “sports motivation” and identified 8 articles to summarize and analyze the contents.

**Results:** Results found that: 1) Goal orientation and the motivation of doing sports have the positive correlation. The less positive on task orientation, the less intrinsic motivation the athletes have. Besides, the less positive on ego orientation, the less extrinsic motivation the athletes have. 2) Ego orientation as the standard of success and intrinsic motivation as the main reason by athletes to participate in sports. 3) There are different goal orientation viewpoints by the gender research.

**Conclusion:** Through the analysis of literature review, we conclude that even though the purpose of doing sports would be changed by the difference of people and a variety of scenarios, the relationship between athletes’ goal orientation and motivation has a strong positive correlation. As for the issues of gender and sports motivation, it requires further study to get more information.

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**Poster Presenter 12**

**Influence of Imagery Training on Sports Performance**

Wei Fan Chien, Chung-Ju Huang

Graduate Institute of Sport Pedagogy, University of Taipei

Taipei, Taiwan

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**Abstract**

**Purpose:** The research confirms that under the correct use, the athletes who combine the sports training and sports imagery training program not only can significantly improve the sports performance but also could be more beneficial than the athletes who only receive the
sports training. The purpose of this paper was to examine the influence of imagery training on sports performance in Taiwan. **Method:** By searched CEPS Archives between 2007 to 2017 from Taiwan Journals by using the keyword “imagery training” and identified 11 articles to summarize and analyse the contents. **Results:** The results were as follows: 1) The athletes who use imagery training are significantly better than those who without it, and male athletes significantly use more imagery training than female athletes. 2) Imagery training group and body training group have the significant difference between pre-test and post-test. 3) The effect of learning through imagery training have significant differences. 4) The role of achievement motivation influences the involvement of athletes in the use of imagery training; different levels of competition and gender influence the use of images by athletes. **Conclusions:** Based on the above findings, there are many researches support that imagery training could help to improve athletes’ performance and rehabilitation of the injury. However, the PETTLEP model that has been emerged in this few years also supported the promotion of performance in different sports or cognitive skills. Therefore, whether is coach or athlete itself, incorporating the imagery into the training program or competition in the future is certainly will happen.

**Poster Presenter 13**

**The relationships of goal orientations, perceived competence and athletes’ Sources of Sport-Confidence**

Ya-Yi Tsai¹, Chou, Li-Ching²

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Ming Chuan University²
Taipei, Taiwan

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**Abstract**

**Purpose:** Sports confidence has long been considered as one of the most important factors affecting sports performance. Many previous studies have shown that athletes usually have better athletic performance if they have higher confidence in the competition. In athletic psychology, gradual adoption of social cognition achievement goal orientation theory, and found that in the goal orientation theory, the task-orientation of the characteristics of people in the process of participating in the movement. There will be a higher perceived competence to self-affirmation. The purpose of this paper was to examine the relationships of goal orientations, perceived competence and athletes’ sources of sport-confidence.

**Methods:** Through the method of literature review, by search the keywords “goal orientation”, “perceived competence” and “sources of sport-confidence by athletes” from 2003-2013. **Results:** Results found that: 1) there is a positive correlation between the task-orientation and the sources of sport-confidence. 2) different genders, ages, and projects have various sources of sport-confidence in their goal orientation. 3) the perceived competence can predict self-confidence, preparation of the match effectively. **Conclusion:** According to the literature study found that athletes’ sports goal orientation and perceived competence are the joint connection to sources of sport-confidence. It is suggested that the self-confidence of athletes should be modeled in the training and competition in order to improve their self-confidence.
**Poster Presenter 14**

**Article review by Sport Passion in Taiwan**

Yen-Tzu Lin, Chung-Ju Huang

_Graduate Institute of Sport Pedagogy, University of Taipei_  
_Taipei, Taiwan_

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**Abstract**

**Purpose:** Sports passion is a crucial reason for supporting athletes to keep practicing and participating in the competition. The purpose of this study mainly analyzed the orientation of sports passion in Taiwan.

**Method:** By searched CEPS Archives between 2013-2017 from Taiwan Journals literature review by the keywords “Sports Passion” to summarize and analyze the contents.

**Results:** Results found that: 1) High-positive correlation between motivation and sports passion. 2) Psychological needs can positively predict sports passion. 3) A positive correlation between coaches’ domestic training and rewarding and sports passion. 4) Prominently-positive correlation between subjective well-being and sports passion. In addition, we find that obsessive passion can influence subjective well-being through positive emotions, which is different from the past research outcome, and it deserves a further study.

**Conclusion:** There are positive correlations among motivation, basic psychological needs and coach leadership behaviors toward sports passion. However, there is also a positive correlation between subjective well-being and sport passion, but because of the influence of obsessive passion, therefore, subjective well-being cannot be counted in. In the future, we can still study further the correlation between obsessive passion and subjective well-being.

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**Poster Presenter 15**

**The Relationship Between Exercise Self-Efficacy and Exercise Participation Behaviour**

Yi-Ta Chuang, Tian-Lu Ke

_Graduate Institute of Sport Pedagogy, University of Taipei_  
_Taipei, Taiwan_

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**Abstract**

**Purpose:** Exercise has been known to help human health, but few people can improve their health through exercise. The main purpose of this study was to understand the relationship between exercise self-efficacy and exercise participation behaviour.

**Method:** Literatures were collected by literature analysis and the related literature about exercise self-efficacy and exercise participation behaviour were collected and analysed.

**Results:** Results found that: 1) The positive correlation between exercise self-efficacy and exercise participation behavior. 2) Exercise self-efficacy can positively predict exercise participation behavior.

**Conclusion:** The positive correlations between exercise self-efficacy and exercise participant behaviour can obtain the value of exercise self-efficacy, it can positively predict individual’s exercise participation behaviour.
**Poster Presenter 16**  
**Research on Overtraining and Burnout of Athletes**  
Cheng, Ju-Chi, Lin, Chi-Chuan  
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_Taipei, Taiwan_

**Abstract**  
**Purpose:** Athletes spent most of the training in order to have outstanding performance. When they get overtraining, it may cause physical damage or psychological abnormalities that affect the performance. The purpose of this research was to understand the relationship between overtraining and burnout of athletes. **Method:** By searched CEPS Archives journals from Taiwan by using the keywords on overtraining and burnout of athletes to summarize and analyze the contents. **Results:** The results were as follows: 1) Athletes may feel at least one burnout in 64% of men and 60% of women in sports life because they can’t cope with overtraining and competition performance. 2) Overtraining is an imbalance between the amount of training and the tolerance of athletes. Therefore, the burnout caused by overtraining may be related to the increase of training but also the athlete's ability of suffering. 3) When the daily training hours increase, the overall of athletics burnout level became higher. division 1 collegiate players than division 2 collegiate players have a higher degree of overall competitive burnout. **Conclusions:** To prevent the overtraining and burnout, it can be set from the short-term goals of the competition and training, relaxation, learning self-adjustment skills, maintain good physical condition and other aspects to be implemented.

**Poster Presenter 17**  
**Cease to struggle and you cease to live: A Narrative Inquiry to a visual impairment coach career**  
Yu-Chun Cheng, Li-Chuan Kao  
_Graduate Institute of Sport Pedagogy, University of Taipei_  
_Taipei, Taiwan_

**Abstract**  
**Purpose:** The viewpoint toward the physically challenged people has been changed and recognized recently. It is wildly a tough challenge for those visually impaired athletes to overcome his or her visual defect and become a recognized coach as well as fit into the world going. **Methods:** The research is a narration. We viewed a track and field athlete, who has a serious visual problem. He struggles hard to become a coach from an athlete. Then we highlight him as the model of our research. **Results:** We analyse his story with the cycle of collect, analysis, and comparison. By the summarize and the analysis of his life, we found a profound connection and meaning with our topic. **Conclusion:** He faces the obstacles with self-recognized and the thought of I am who I am. He encounters the stereotype the people give them. However, the encouragement and expectations from his family support him to be strong and go through those tough situations. He is now living his ideal unique life which we admire most.
**Poster Presenter 18**

**The Relationship of Perceived Coach Leadership Behaviours to Intrinsic Motivation and Team Cohesion of Athletes**

Ming-Hsuan Hsieh, Chien-Chih Chou  
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*Taipei, Taiwan*

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**Abstract**

**Purpose:** Coaches play a leading role in sports teams; coach leadership behaviour will affect the athlete's performance and motivation to participate (Chelladurai, 1984). For athletes, coaching leadership is an important factors that influences intrinsic motivation and team cohesion. The purpose of this study was to investigate the Relationship of Perceived Coach Leadership Behaviors to Intrinsic Motivation and Team Cohesion of Athletes.

**Methods:** The method of study was using literature review by CEPS database to search perceptual coaching leadership behavior, intrinsic motivation, and team cohesion. A total of 8 papers (2003-2015) in Taiwan were searched, and the contents were summarised and analysed. **Results:** the results were as follows: 1) As for coach leadership behaviour, autocratic behavior is negatively correlated with intrinsic motivation. Training and guidance, democratic behavior, social support, and positive feedback are positively correlated with intrinsic motivation. 2) As for coaching leadership, autocratic behavior is negatively correlated with team cohesion. Training and guidance, democratic behavior, social support, positive feedback positively correlated with team cohesion. **Conclusion:** Regardless of intrinsic motivation or team cohesion, coach's autocratic behaviour can have a negative effect. Therefore, the coach should regularly check whether he has too much autocracy in teaching, and give players more opportunities to participate in decision-making, care about the player's welfare, and the player's good performance to give appreciation and rewards.

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**Poster Presenter 19**

**Predictive utility of mindfulness and psychological skills on volleyball service’s error rate**

1Yi-Ju Chen, 2Chia-yin Liang  
1Chinese Culture University  
2National Taiwan Normal University

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**Abstract**

The Purpose of this study was to examine the prediction of mindfulness and psychological skills on service’s error rate among division I collegiate volleyball players. We recruited 195 volleyball players from Division- I in Taiwan. After receiving informed consent, interested participants completed the Chinese-version Mindful attention Awareness Scale and psychological skills Inventory which assess their mindfulness and psychological skills. The service’s error rate was collected in 2014 semi-final. The descriptive statistics, Person’s correlations and multiple linear regression analyses were used to analyze the data. Results indicated that: (1) Participants have middle level of mindfulness and psychological skills but low service’s error rate. (2) The mindfulness, psychological skills and service’s error rate were significant different in terms of gender, grades and training hours. (3) Mindfulness was positively associated with “coachability” and “concentration” in psychological skills. The service’s error rate was negatively associated with “concentration” in psychological skill. (4)
Mindfulness failed to predict service’s error rate. (5) The “concentration” in psychological skill negatively predicted service’s error rate.

**Poster Presenter 20**

**Effects of Physical Activity Combined with Nutritional Supplements on Cognitive Function in Older Adults: A Literature Review**

Feng-Tzu Chen¹, Tai-Sheng Chen¹, Yu-Min Ho², Yu-Kai Chang¹

¹Graduate Institute of Athletics and Coaching Science, National Taiwan Sport University
²Hsiuping University of Science and Technology

**Abstract:**

Cognitive function is strongly affected by advancing age. Recently, studies showed that combination of physical activity (PA) and nutritional supplements (NS) has been explored the effect on cognitive function in older adults. Therefore, this review attempted to review previous experimental studies to examine whether combination has additional benefits in cognitive function compared to intervention of PA or NS alone. We systematic research related literature written by English language with unlimited publication date and targeted on studies of human being. After literature reviewing, there are three studies focused on these issue. Results of one studies found that combination of strength training and protein supplements had positive effects on specific domain of cognitive function (e.g. processing speed). Further, another studies of event-related potentials (ERPs) showed that older adults with interventions of walking combined with vitamin E benefits in increasing P300 amplitude and decreasing P300 latency, suggesting the intervention enhance individual attentional allocation and efficiency of information processing. However, one of three studies indicated that PA combined Creatine supplements has no significantly difference in cognitive function as compared to those engaged in PA or NS alone. Taken together, three studies establish basic knowledge about the effect of combination of PA and NS on cognitive function in older population. Based on the results from the literature review, we suggested that physical activity prescriptions (e.g. mode, frequency, intensity, and duration) and nutritional dose-responsive relationship on cognitive function can be further considered for future human research.

**Poster Presenter 21**

**Shooting Athletes' Psychological Traits and Training**

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**Abstract:**

In sports, athletes need high psychological qualities to deal with any conditions. Specifically, athletes should control and adjust physical and mental conditions by themselves in order to face various competitions. Shooting athletes, a sport needs high self-control psychological traits and immediately adjust great psychological state, so we suggest psychological quality is very important for the shooting athletes. In addition, previous studies indicated athletes often face a moment that distract their attention and cause great mistakes in the sport, so formulating unique training programs or modes according to individual situations and characteristics in necessary. Therefore, the review will focus on literatures about
relationship between shooting athletes and psychological trains and coding trainings. Specifically, we will focus on athlete self-confidence in training, inspire the athlete’s potentials, as well as stage training mode. Lastly, we suggest athletes need to adapt to the competition environment and develop a corresponding training mode to emphasise psychological traits and training.

**Poster Presenter 22**

**Self-talk and Executive Function: A Literature Review**

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²Ta Hwa University of Science and Technology

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**Abstract:**

Mental skills training in the field of competitive sports has always been important issues, self-talk is one of the four mental skills training, and it can enhance self-confidence, concentration, reduce anxiety and cognitive interference to improve athletic performance by intervene self-talk program. In recent years, Self-talk divided to instruction and motivational self-talk, the instruction self-talk is more suitable for tasks of accuracy and stability, the motivational self-talk is more suitable for tasks of power and endurance. Self-talk not only improve athletic performance, research shows that self-talk can enhance executive function, more recently discussed the use of third-person self-talk can enhance emotional regulation and reduce cognitive control, after reviewing It has been found that the involvement of self-talk is related to cognitive performance. However, current research indicates that good cognitive function is one of the necessary conditions for elite athletes, From the above we know that the use of self-talk to select the appropriate type of statement, the content of the statement also has a significant impact. Most of the sports psychologists devote themselves to the study of self-talk for the promotion of sports performance, whereas the study of self-talk program involved in the study of the effects of executive function is very rare. Future research can further clarify the influence of self-talk program on cognitive function and performance improvement. Expect the program to help athletes achieve better performance.

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**Poster Presenter 23**

**“Confidence is not luck”: A Case study on the Mental coaching program for Seoul E-Land FC U-15 Soccer players**

DoJin Ahn, YoungHo Kim

Seoul National University of Science and Technology, Korea

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**Abstract:**

The purpose of the study was to identify effect of mental coaching on promoting player’s confidence in soccer competition. In the initial stage, the soccer players who are participated in this program were instructed necessity of mental coaching and discussed about confidence as an important factor that youth player should have. Then, sport confidence scale and self-efficacy scale were applied to measure individual’s confidence and explore individual’s physical and psychological level. Results indicated that youth soccer players’ confidence was promoted by the mental coaching program. This finding implies that mental training should be instructed as soon as possible from adolescence because youth players’ psychological attributes are quickly changed.
Poster Presenter 24
Effects of parental support on elite high school soccer player's self-esteem and athletic performance
Chunghee Han, Changhyun Kim, Yongjun Yoo
Korea National University of Education, Korea

Abstract:
The objective of this study is to figure out whether parental support effects on elite high school soccer player's self-esteem and athletic performance by player's grade, experience, and prize-winning career, and to find it out empirically. The subjects of analysis are high school soccer players who are registered in Korea Football Association. We distributed questionnaire to 180 high school soccer players who are in Seoul, Cheongju, and Pohang and used 151 survey result which is valid. All data was analyzed by using SPSS 21 program. To find out the effect of parental support on self-esteem and athletic performance by grade, experience, and prize-winning career, we used one-way ANOVA. To figure out the effect of parental support on self-esteem and athletic performance, we used correlation analysis and multiple regression analysis, and drew following conclusions. First, there is no meaningful effect of parental support by high school soccer player's grade, experience, and prize-winning career. Second, by player's grade, experience, and prize-winning career, elite high school soccer player's self-esteem and athletic performance differs in soccer-IQ, and motivation. Third, there is correlation between parental support and high school soccer player's self-esteem and athletic performance. Forth, emotional support, which is a sub factor of parental support, has significant correlation with high school soccer player's athletic performance especially for first grade student. According to this study, parental support has no meaningful correlation with player's self-esteem and athletic performance. So, other than parental support, factors such as coach's influence and player's personal may have effect on elite high school soccer player's self-esteem and athletic performance. There should be more other studies on elite high school soccer player's self-esteem and athletic performance in the future for a development of Korea's soccer.

Poster Presenter 25
The Effect of Neurofeedback and ECG feedback Intervention on Peak Performance: A Case Study of Disabled Shooting Athletes
Hwang, J1, Oh, M.J.2, Cho, K.1
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2Woosuk University

Abstract:
Neurofeedback and ECG feedback aims to improve athletes' performance by training their performance-related psychological skills. The purpose of this study is to examine the effect of Neurofeedback and ECG feedback on Korean disable shooting athletes. The participants were one male wheelchair shooting athletes, who were training for the National Para championship and attended CBNU PST session over a four-month period. We used Quick-20 Dry EEG Headset and ECG equipment and Cognionics Acquisition Beta, TeleScan and BrainMap-3D program. PST Neurofeedback consist of alpha and beta brainwave, ECG feedback consist heart rate; HR, stress resistance; SR, sympathetic nerve system; SNS and para sympathetic nerve system; PSNS. The results showed that optimal shooting time and
frequency for peak performance shooting based on the individual psychological and physiological traits. Psychological and Physiological traits making this outstanding outcome are discussed.

**Poster Presenter 26**

**Relationship between Personality Traits of Middle School Students on Negative Factors of School Physical Education Emotion**

Changhyun Kim¹, Hunhyuk Choi¹, Gaptaik Ro²

¹Korea National University of Education
²Myongji University

**Abstract:**

In order to test the Relationship between personality traits of middle school students on the negative factors of school physical education emotion, 250 students from 5 different middle school were randomly selected for multiple regression analysis. For extroversion and neurosis, NEO personality test by Guidance Korea was used and school physical education emotion was explored on its negative aspects, including jealousy, depression, rage and anxiety, using the questionnaire developed by Changhyun Kim (2017). A hypothesis was established with the premises that extroversion negatively affected and that neurosis positively affected school physical education emotion. As for the hypothesis on extroversion, depression (β = −.294, p = .000), rage (β = −.221, p = .000), and anxiety (β = −.370, p = .000) were selected and jealousy (β = −.065, p = .298) was not selected. As for the hypothesis on neurosis, jealousy (β = .319, p = .000, p = .000), depression (β = .373, p = .000), rage (β = .211, p = .001), and anxiety (β = .294, p = .000) were all selected. Where p = .000, the regression model displayed jealousy (F = 17.957, R² = .121, Durbin-Watson = 1.816), depression (F = 57.414, R² = .306, Durbin-Watson = 1.730), rage (F = 19.026, R² = .128, Durbin-Watson = 1.894), and anxiety (F = 56.563, R² = .303, Durbin-Watson = 2.023), indicating that the model is appropriate. Based on these results, it is known that middle school students with extrovert tendencies displayed, of the negative factors, low levels of depression, rage and anxiety, and students with high neurosis displayed high levels of jealousy, depression, rage and anxiety.

**Poster Presenter 27**

**Effects of physical activity and psychological modification-based intervention strategies on physical fitness and psychological variables in middle school girls**

JiHo Kim, YeEun Yun, YoungHo Kim

Seoul National University of Science and Technology

**Abstract:**

Purpose: The current study investigated the effect of an intervention incorporating physical activity and motivational enhancement strategy on BMI, physical activity levels, and psychological variables toward physical activity in female adolescents.

Methods: Sixty females were voluntarily participated in the 12-week intervention. During this period, the study participants’ BMI, physical activity levels, self-efficacy, motivation, and perceived benefits and barriers were measured at the pre and post interventions.

Results: Results indicated that obese adolescents’ BMI significantly decreased (F = 3.51, p = .03) and physical activity (F = 4.01, p = .02) significantly increased over the 12-week obesity intervention. In addition, Exercise self-efficacy (F = 5.02) and perceived benefits
toward physical activity (F = 5.34) significantly increased but perceived barriers of physical activity (F = 5.10) gradually decreased over the intervention.

Conclusion: This study suggests that an intervention combining physical activity and motivational enhancement strategy significantly contributed to decreased BMI, increased physical activity, and positively changed psychological variables related to physical activity.

**Poster Presenter 28**

**Validating the Korean Version of the Physical Activity and Leisure Motivation Scale (PALMS-K)**

JongKwan Lee, Soojin Kang, Inkyoung Park, Youngho Kim  
Seoul National University of Science and Technology

**Abstract:**

Purpose: The purpose of the study was to validate Physical activity and leisure motivation scale in the cultural context of Korea.

Methods: A total of 1,038 Korean adults (male: 547, female: 491, Mage = 43.2 ± 7.23 years) were voluntarily recruited from a variety of physical activity categories, including individual sports, team sports, and exercise. Item analysis, factor analysis, reliability test, correlation analysis, and analysis of variance were applied to test the study hypothesis.

Results: The Korean version of physical activity and leisure motivation scale (PALMS-K) with 7 sub variables and 24 items was developed by conducting a series of analysis. In addition, physical activity and leisure motivation was different by gender, age, and regular exercising or not.

Conclusions: The revised PALMS-K demonstrated acceptable factor structure, internal consistency, and test-retest reliability. It was applicable to diverse physical activity contexts.

**Poster Presenter 29**

**Relationships of physical activity participation with self-esteem and life satisfaction among adults with physical disabilities**

SungMo Lee, JunWon Kim, Youngho Kim  
Seoul National University of Science and Technology

**Abstract:**

Purpose: This study examines the relationship between participation of physical activity and self-esteem and life satisfaction of people with physical disabilities.

Methods: The participants were 182 people with physical disabilities who are exercising at 5 rehabilitation sports centers in Seoul (Gomduri Sports Center, Gibunwoori Sports Center, Dongcheon Rehabilitation Sports Center, Seobu Rehabilitation Sports Center, and Gyeonggi Sports Center). Self-esteem questionnaire and life satisfaction scale were applied in the study. Description analysis, t-test, ANOVA, correlation and multiple regression analysis were conducted.

Results: Results indicated that participants’ self-esteem was the significant differences as the frequency of physical activity (p<.05), but there was no significant difference during the participation period of physical activity. The frequency of participation in physical activity was correlated with self-esteem and life satisfaction (p<.01).

Conclusion: This study implies that the effect of physical activity participation of the handicapped on self-esteem is influenced by the frequency of participation, and the satisfaction of life infects the education.
**Poster Presenter 30**

**Effects of an Obesity Intervention Based on the Transtheoretical Model on Physical Activity and Its Related Psychological Variables in Middle-aged Women**

DongHyuk Yeo, YoungHo Kim, SooJin Kang

*Seoul National University of Science and Technology*

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**Abstract:**

The study aimed to examine the effect of an obesity intervention incorporating physical activity and psychological modification strategy on BMI, physical activity levels, and psychological variables toward physical activity in middle-aged women. Thirty-eight middle-aged women who had BMI greater than 25 kg/m² participated in the 16-week weight control program. During this period, the study participants' BMI, physical activity levels, self-efficacy, and perceived benefits and barriers were measured at the three-time point (baseline, after week 8, and after week 16). Results indicated that obese middle-aged women' BMI significantly decreased ($F=4.32$) and physical activity ($F=3.14$) significantly increased over the weight control program. In addition, Exercise self-efficacy ($F=4.88$) and perceived benefits toward physical activity ($F=4.65$) significantly increased but perceived barriers of physical activity ($F=4.12$) gradually decreased over the intervention. The program applied in the study was effective to positively changes in weight loss, physical activity, and related psychological variables in middle-aged obese women. Therefore, this study suggests that it is important to consider not only physical itself, but also the various psychological variables when planning and implementing the weight control program.

**Poster Presenter 31**

**Relationship of Psychosocial Factors with Physical Activity Participation in Adolescents**

JaeHyun Yem, SooJin Kang, YoungHo Kim

*Seoul National University of Science and Technology*

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**Abstract:**

**Purpose:** The purposes of the present study were to explore level of physical activity in adolescents, to identify the differences in psychological and social variables by stage of physical activity, and investigate the relationship of psychosocial variables with physical activity. **Methods:** A total of 561 adolescents (Male: 229, Female: 332, Mage = 13.32 years, SD = .654) in the Nowon district were voluntarily participated in the study. Stage of physical activity measure, self-efficacy measure, exercise attitude scale, social support measure, and self-regulation scale for physical activity were applied to evaluate the participant's level of physical activity, psychosocial variables relating to physical activity. Frequency analysis, X²-square test, MANOVA, and regression analysis were conducted to analyze data obtained in the study. **Results:** 70.5% of participants reported that they are inactive (precontempolation and contemplation) or doing physical activity on an irregular basis. Moreover, self-efficacy, exercise attitude, internal motivation, and parental support were significantly different according to stage of physical activity. These psychosocial variables had 62% of variance in explaining physical activity and of them self-efficacy was best predictor to account for physical activity. **Conclusion:** The present study suggests that further study should apply structure equation model to test causal relationship between the psychosocial variables and physical activity.
**Poster Presenter 32**

**The Effects of Listening to Music and Instrumental on Ergometer Duration**

Phichayavee Panurushthanon  
Srinakharinwirot University, Thailand

**Abstract:**
The purposes of this present study were to study and compare the effects of listening to music and instrumental on ergometer duration. Participants were twelve students of Sports Sciences Department of Srinakharinwirot University (Male = 6, Female = 6), age ranging from 18 – 19 years old (M =18.41, SD = .15). They all were assigned to listen to three types of music (music, instrumental, none-music or instrumental) during ergometer. Intensity of 70 watts was begun and increased 35 watts in every 4 min in which subjects would maintain 70-75 rounds per min till they felt exhausted, and then recorded their bicycling duration and maximum heart rates. Results showed that after listening three types of music, 1) participants produced three ergometer durations of music, instrumental, none-music or instrumental (M = 12.19, SD = .92; M = 11.29, SD = .89; M = 10.96, SD = .75) respectively, 2) listening to music and none-music during ergometer duration affected on statistically significant differences of duration, Alpha level at 0.05, 3) listening to music and instrumental during ergometer duration affected statistically significant differences of duration, Alpha level at 0.05, and 3) listening to music affected highest duration of ergometer, and then to instrumental and to none-music, respectively. This study suggests that study of components of music and instrument can explain which one should be used for exercise enhancement which is based on thought, and motivation in taking longer time to do exercise. Although, music reported greater data than another two, however the two produced a little bit difference of heart rate and exercise duration from music. So, they should be taken into account for particular purpose.

**Poster Presenter 33**

**Thai Monozygotic Triplets’ Recovery from Thai Dance Activity Using Imagery Intervention**

Tirata Bhasavanija  
Sports Sciences Discipline, Ramkhamhaeng University, Thailand

**Abstract:**
This study aimed to examine three physiological variables, oxygen saturation (SpO²), heart rate (HR), and body temperature (BT), including perceived fatigue at rest, over 44-min Thai dance, and then measure these variables again, after the performance of warmth imagery in monozygotic triplets. Participants were three Thai female triplets (T) who were born to the same mother, at the same time, and share the same environment, 18 years of age. They were giving their health-check details (T1 = normal; T2 = hyperactivity; T3 = hypotension) and tested their body temperature (BT: Degree Celsius), oxygen saturation (SpO²: percent), heart rate (HR: time/second), and perceived fatigue (FT: 5 point rating scale) at rest, over 44-minute Thai dance, and at imagery intervention sessions, lasting approximately 1 and half hour. Two-way ANOVA repeated measures were used to be comparing main effects between each variable, as well as to examine whether imagery intervention affected on recovery from physiologies and fatigue. Finally, a visual analysis of graph was used to find relation among dependent variables. Results of this study are; 1) SpO²: there was no a
significant main effect of sessions, (F (2,30) = 1.04, MSE = 3.02, p > .05), as well as there was also no a significant main effect of health, (F (2,30) = .43, MSE = 1.25, p > .05), and there was no a significant interaction between of sessions and health, (F (4,30) = .13, MSE = .39, p > .05), 2) HR: there was a significant main effect of sessions, (F (2,30) = 1.04, MSE = 2446.39, p < .05), as well as there was also no a significant main effect of health, (F (2,30) = .57, MSE = 88.51, p > .05), and there was no a significant interaction between of sessions and health, (F (4,30) = .45, MSE = 1.25, p > .05), and there was no a significant interaction between of sessions and health, (F (4,30) = .57, MSE = 2446.39, p < .05), as well as there was also no a significant main effect of health, (F (2,30) = .57, MSE = 88.51, p > .05), and there was no a significant interaction between of sessions and health, (F (4,30) = .45, MSE = 1.25, p > .05), 3) BT: there was no a significant main effect of sessions, (F (2,30) = 1.13, MSE = .29, p > .05), as well as there was also no a significant main effect of health, (F (2,30) = 1.71, MSE = .36, p > .05), and there was no a significant interaction between of sessions and health, (F (4,30) = .05, MSE = .01, p > .05), and there was no a significant interaction between of sessions and health, (F (4,30) = .16, MSE = .01, p > .05). This study suggested that all triplets generated low oxygen saturation and body temperature as the same way general human are during working out. Nevertheless, one of three triplets who had a hypotension generated low heart rate as an opposite way another two had done, however, their perceived fatigue levels were highly generated during working out. Finally, this study showed that at imagery intervention session, all triplets’ physiologies and fatigue can be retrieved which might be useful for physical activity recovery.

Poster Presenter 34

Thai Monozygotic Triplets’ Differences of Body Temperature, Oxygen Saturation, Heart Rate and Perceived Fatigue during Thai Dance over a period of 44 minutes

Tirata Bhasavanija, Kornsuang Panin
Ramkhamhaeng University, Thailand

Abstract:

Purpose: The study was to examine the differences of body temperature, oxygen saturation, heart rate, and perceived fatigue during rest, 44-min Thai dance in monozygotic triplets.

Method: Participants were three Thai female triplets (T) who were born to the same mother, at the same time, and share the same environment, 19 years of age. They were tested their body temperature (BT: Degree Celsius), oxygen saturation (SpO2; percent), heart rate (HR: time/second), and perceived fatigue (PF: 5 point rating scale) over 44-minute Thai dance period. The trial was created as a quasi-experimental research, taking approximately 1 and half hour. As for data analysis, we evaluated the differences between a baseline data and an every 4-min-time test data collected over 44 minutes. Moreover, the paired sample t-test was used to analyse the data of each session. Finally, visual analysis of graph was used to describe what happened over a period of trial by using the real data.

Result: The results of this study are: 1) there were statistically significant differences evaluated over 44-minute Thai dance period in oxygen saturation between T1 and T3 (t = -3.50, p = .005), as well as in heart rate between T1 and T2 (t = -6.31, p = .000) and between T2 and T3 (t = 3.62, p = .004), moreover, in body temperature between T2 and T3 (t = 2.32, p = .040), and there was no significant difference in perceived fatigue, however, 2) there were differences at 16-min time in body temperature among of T1 (38.60°C), T2 (36.70 °C), and T3 (36.40 °C), as well as at 20-min time in heart rate among of T1 (127 time/sec.), T2 (119 time/sec.), and T3 (89 time/sec.), at 38-min time in oxygen saturation among of T1 (99%), T2 (90%), and T3 (97%), and at 38-min time in perceived fatigue among of T1 (3.99 points), T2 (3.97 points), and T3 (4.21 points).

Conclusion: This study indicated that fatigue is reasonable for cardiac
functioning in order to go a bit slower on heart rate which can also decrease level of oxygen throughout the body (Nelesen, Dar, Thomas, &Dimsdale, 2008).

**Poster Presenter 35**

**The Correlation between Knowledge of Physical Activity and Physical Activity Behavior of Education Students, Silpakorn University**

Wannee Jermsuravong, Amornthep Chaunchang
Silpakorn University, Thailand

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**Abstract:**

**Purpose:** This research aims to study the correlation between knowledge of physical activity and physical activity behavior of education students, Silpakorn university. **Method:** The study used quantitative research method by simple random sampling from 1683 students in Faculty of Education. Samples include 100 students from 1st - 4th years student The data were collected by questionnaire and analysed using means (M), Standard deviation (S.D.) and correlation (r) between knowledge of physical activity and physical activity behavior. **Results:** The study showed that (1) The average score of knowledge in physical activity (N=100) was 19.70 and standard deviation (SD) was 4.58. The average score of behavior in physical activity (N=100) was 15.48 and standard deviation (SD) was 4.58. These data showed medium level of knowledge and behavior in physical activity. (2) The correlation between knowledge of physical activity and physical activity behavior showed high level (r =.870) and significant difference at level .01. (3) The data of 100 samples showed 46 samples was high score of knowledge (M=24.21, SD = 3.50) and 54 samples was low score of knowledge (M=16.17, SD = 0.88). 46 samples was high score of physical activity behavior (M=21.03, S.D.=1.54) and 54 samples was low score of physical activity behavior (M=10.35, SD =1.08). (4) The correlation between high knowledge of physical activity and high physical activity behavior showed r =.429 and significant difference at level .01. The correlation of high knowledge and low physical activity behavior was r =.364 and significant difference at level .05. The correlation of low knowledge and high physical activity was r =.268 and not significant difference. And the correlation of low knowledge and low physical activity was r =.588 and significant difference at level .01. **Conclusion:** Knowledge and behavior was correlated. The level of physical activity knowledge is correlated with level of physical activity behavior. Therefore, it should promote the knowledge of physical activities for students to increase their physical activity.

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**Poster Presenter 36**

**The Effect of Tai-Chi and Elastic Exercise on Health-Related Physical Fitness of Older Persons**

Palung Nitusganjananon, Phichayavee Panurushthanon
Srinakharinwirot University, Thailand

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**Abstract:**

The purpose of this study was to compare the effects of health-related physical fitness of older person in Mueang Phetchabun Municipal District between control and experimental groups. Participants were 60 older persons who lived in Mueang Phetchabun Municipal District. Recruited by a multistage sampling, they were firstly recruited their health state (e.g. diabetes, blood pressure, heart and circulation diseases, and others associated with harm
for exercise), secondly used a purposive sampling, and used a simple random sampling. Participants were divided into two groups, as 30 persons a group: a control group was assigned not to exercise, and an experimental group was given the Tai-Chi and elastic exercises. The exercise program was created and consisted of twelve skills of Tai-Chi used for stretching and cooling down session, as well as seventeen drills of elastic exercise. This program was, proved by three sport science experts, and lasted 60 minutes per time, three times per week, for eight weeks, at 04:30 – 05:30pm. For the data collection, a physical fitness test of older person developed by the Sport Sciences Office of Department of Physical Education, Ministry of Tourism and Sport of Thailand was used: 1) Chair stand test, 2) Arm curl test, 3) Chair sit and reach test, 4) Back scratch test, and 5) 2-minute test. Physical fitness Mean and Standard Deviation before training and after training at week 4 and after training at week 8 of experimental and control groups were used to study the effects of Tai-Chi and elastic exercises. Moreover, One-way Analysis Variance examined the difference of exercise of control group and experimental group before training and after training at week 4 and week 8, Alpha level at .05, and then used a paired comparing by Tukey method with Bonferroni. Results are 1) there were significant differences of all physical fitness effects of experimental group between before training and after training at week 4, 2) there were significant differences of all physical fitness effects of experimental group between before training and after training at week 4 and at week 8, except on cardiovascular endurance, 3) there were no differences of all physical fitness effects of control group between before training and after training at week 4, 4) there were no differences of all physical fitness effects of control group between after training at week 4 and week 8, except on leg muscle strength and endurance, 6) there were no differences of all physical fitness effects of control group between before training and after training at week 8, 7) there were no differences of all physical fitness effects between experimental group before training and control group after training at week 4, 8) there were significant differences of all physical fitness effects between experimental group after training at week 4 and control group after training at week 8, and 9) there were significant differences of all physical fitness effects between experimental group before training and control group after training at week 8. The results of this study are that Tai-chi and elastic exercises affecting the significant higher levels of muscle strength in older persons than before training (Song et al., 2003; Paksa, 2010), as well as of muscle endurance (Kridsanakringkrai, 2007; Roger et al, 2002), and of physical fitness and cardiovascular endurance (Lau et al, 2004). This study suggested that aerobic and resistance exercises seem like Tai-chi and elastic exercises can help older persons to develop their health-related physical fitness.

Poster Presenter 37

Imagery of Sepaktakraw Serving Skill on Serving Accuracy in Thai University level Athletes

Kritchaya Poompin

Physical Education Discipline, Ramkhamhaeng University, Thailand

Abstract:

Sepaktakraw serve is considered as a very important technique for beginning the game, so the accuracy of serve is needed. The cognitive specific imagery program can enhance the serving performance for which the 6-week training is sufficient an enhancement (Poompin, Chirathammawat, Bhungobs, & Bhasavanija, 2015). Purpose: this study aimed to examine whether university level athletes’ serving accuracy was higher after sepaktakraw serving skill imagery training than baseline. Method: Participants were 24 Thai athletes (Male = 12, Female = 12) of Ramkhamhaeng University who were serving position players, the age
range of 18 to 20 years old (19.05±.11). They were randomised and divided into two groups; Group 1 was assigned to practice as following the commonly used programme, and Group 2 was assigned to practice a serving skill imagery training programme together with a commonly used programme. **Tools:** 1) sepaktakraw serving accuracy test (Poompin et al, 2015), and 2) the imagery training programme was created as a cognitive specific imagery lasting approximately 10 min per day, 5 days per week, for 8 weeks. **Data Analysis:** The serving accuracy data were collected and compared between at baseline, after 4-week and 8-week trainings, using the Paired t-test for comparison within and between groups. **Results:** This study results in; 1) There was no significant difference of serving accuracy at baseline between control group and experimental group, 2) after 8-week imagery training, there was no statistically significant difference within control group, and there was statistically significant difference within experimental group, and 3) there was statistically significant difference between control and experimental groups after training at Week 4, and also at Week 8. **Conclusion:** The results of this study are similar to previous studies are that an imagery training programme on sport performance can be useful for enhancing the sport skills. This study suggests that imagery, as a mental technique, should be applied for sport coaching in order to help athletes to succeed their games.

**Poster Presenter 38**

**Effects of Imagery on Physical Activities of Children and Youth**

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**Abstract:**
The behaviors which lacked physical activities problem Influencing health risks. Six percent of people over the world died from this cause. Such routine greatly concerns more risks of having diabetes, cancer and coronary disease. This is considered the important issues in developing countries in Asia. According to the survey of the world’s prevalence of obesity, the number of obese people in 2014 were approximately 41 million, most of which were children and youths (World Health Organization, 2014). Imagery is the pattern of motivation for physical activities and exercising that important for success in sport and exercise. There are several studies have been associated with imagery in exercising for adults which motivated them to exercise (e.g., Giacobbi, Hausenblas, Fallon and Hall, 2003; Giacobbi, Hausenblas and Penfield, 2005; Hausenblas, Hall, Rodgers and Munroe, 1999). According to the previous study, it revealed that the result from intervention of imagery in physical activities made people motivated to persist with physical activities (Andersson & Moss, 2011; Duncan, Hall, Wilson and Rodgers, 2012; Murru and Martin-Ginis, 2010; Stanley and Cumming, 2010) akin to Stanley, Cumming, Standage and Duda (2012) stating which imagery in physical activities led to motivation and satisfaction in workout. Tobin et al. (2013) the study found that imagery can improved children’s participation in physical activities in each aspect. There are studies proving that imagery created inspiration and motivation for children and youth to move their bodies. Imagery is the change of attitudes of people who are positively trained in imagery for better attitudes and EQs (Holmes et al., 2006, 2008c). Fritz Renner, et al. (2014) it revealed that using imagery in physical activities by exercising
improved thinking processes in terms of emotion which affected the continuation of physical activities in the future. According to the aforesaid study, it was significant to verify strategies to support the level of physical activities for children.

**Poster Presenter 39**

**Self-Concept A Team Sport and An Individual Sport of University Athletes**

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²Faculty of Sport science, Burapha University, Thailand, 20130, Chonburi, Thailand.  
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**Abstract:**
The purpose of this study was to compare self-concept between a team sport and an individual sport university athletes. The target population for this study was athletes attending the 43th University Games and administered to a sample of 100 University Athletes, 50 athletes from a team sport (Hockey players, Basketball players and Football players) and 50 athletes from an individual sport (Boxing, Taekwondo, Badminton, Swimming and Athletics). The age of the subjects was ranging from 18 to 22 years. Data was collected with regard to self concept variable from 100 male players in three consecutive days. Self concept was assessed by Thai elite athlete self-concept description Questionnaire employing Raksarson, S. & Janesawang, D. (2017). The data was analyzed by Descriptive Statistic, Mean, Standard Deviation & one way analysis of variance (ANOVA). The level of significance was set at 0.05. The findings of the study in relation to self-concept showed significant difference a team sport and an individual sport university athletes.

**Poster Presenter 40**

**The Needs of Competency Development of Thai Sport Organisation employees**

Waliapon Arjareewattana, Sinart Narkwachara, Anak Pradithharom, Ekkasit Sanamthong, Wattanasom Meksuwan, Tirata Bhasavanija  
Ramkhamhaeng University, Thailand

**Abstract:**
The aim of this study was to examine requests for needs of competency development of sport organisation employees, in Thailand. **Method:** Participants were 54 Thai employees who were working for the Sport Institute of Ramkhamhaeng University, age ranging from 24 to 60 years old. They were interviewed about their own requests for needs of competency development. The trial was created as a descriptive research, taking approximately one month for data collection. The data was described as a composition writing style. **Results:** The needs responded at high to low frequencies are 1) support of diversity (e.g. motivation, reward, facilities), 2) judgment (e.g. position promoting, decision of Head/Manager), 3) cooperation/teamwork (e.g. job description), 4) job/technical knowledge.
(e.g. special training), 5) innovation (e.g. modern technology devices), 6) quantity of work (e.g. action plan), 7) organisational competencies (e.g. changes of culture), 8) organization (e.g. using the rule to guide action), 9) staff development (e.g. workshop, training for talent), 10) technical competencies (e.g. particular skill), 11) commitment to safety (e.g. personal responsibility), 12) functional competencies (e.g. putting the right man on the right job), 13) behavioural competencies (e.g. development of individual efficacy), 14) communication (e.g. meeting for all working processes), 15) customer service (e.g. setting a rule of customer service), 16) quality of work (e.g. maintaining the high standard), 17) reliability (e.g. due on time), 18) problem solving (e.g. clearly considering the cause and effect), 19) attention to detail (e.g. focusing on the rules), 20) flexibility (e.g. the rule should be changed as followed situation), 21) quality control (e.g. based on standard), 22) responsiveness to requests for service (e.g. measuring the customers’ needs), 23), initiative and creativity (e.g. how to solve a problem), 24) Core competencies (e.g. strategic strength), 25) management competencies (e.g. potential of individual’s management), respectively. **Conclusion:** This study indicated what employees mostly needed are motivation, reward, facilities, position promoting, decision of Head/Manager, job description, special training, and modern technology devices. We suggested that organiser should be taking these into account to achieve both personal and organisational goals.

**Poster Presenter 41**

**Personality Traits between University Athletes and Non-Athletes**

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**Abstract:**

Understanding the personality of athletes can help in aiding the purpose of why one should get involve in physical activity to the extent of joining any type of competition in any levels. The aim of this study is to identify the personality traits of neuroticism, extroversion, agreeableness, openness to experience and conscientiousness between university athletes and non-athletes. The cross-sectional study was conducted among university students (n=377) by means of proportionate technique. The NEO Five Factor Inventory (NEO-FFI) was used as the instrument for this study. The inventory consists of 60 items with 5-point Likert-type scale. The data were analysed using Independent Sample T-test (IBM SPSS version 22). This present study revealed that there were significant difference in neuroticism, extroversion, agreeableness and openness to experience except conscientiousness between university athletes and non-athletes. In conclusion, athletes known to have higher score for positive personality traits compare to non-athletes. It is important to pay attention in sport activity involvement in order to deal with any obstacles or challenges in daily life.
Poster Presenter 42

Mental Toughness in Sport: A Preliminary Review

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Abstract:
Mental toughness is a term that is often used to describe a collection of psychological characteristic thought to be central to high performance. Over the last decades, numerous studies have showed that mental toughness plays a significant role in successful performance. However, most early research into the effects of mental toughness was merely descriptive, and only recently were the theoretical and systematic bases of mental toughness structure and concepts significantly established. Additionally, previous studies were based on a variety of measurements and research designs focusing on mental toughness and concepts, resulting in a number of different points of view. The purpose of this study is to review some of the emerging definitions and conceptualizations, and examine how mental toughness might be developed in performers. Qualitative and quantitative approaches to the study of mental toughness are evaluated, and developments in measuring this important concept are discussed. This review focus including the contemporary mental toughness research applying qualitative approaches and contemporary mental toughness research using quantitative approaches. Conclusion and future research recommendations in these areas are also be discussed. Although these discussions center on the general of mental toughness, we believe many of the issues have relevance to scholars and practitioners interested in the measurement of psychological variables as they pertain to sport, exercise, and other performance or achievement contexts.

Poster Presenter 43

Implementing Physical Activity in Malaysian Schools: A Preliminary Review

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Abstract:
This study attempts to review physical activity interventions in Malaysian schools that are quasi-experimental based. The databases used during the literature search were ScienceDirect and PubMed ranging from 2012 until 2017. A total of five interventions were found. Firstly, EPaL provides students with cognitive and behavioural skills to effect changes in targeted behaviours by aiming to alter disordered eating behaviour, promote physical activity, prevent sedentary lifestyle and enhance eating behaviours. In addition, the integration of the transtheoretical framework improves adherence. Circuit training was also use in three other studies during physical education classes. The results showed significant improvements in: reduction of BMI before (N = 26.24, SD = 2.29) and after (N = 24.88, SD = 2.28) the interventions; main effect in cardiovascular endurance F (1, 83) = 44.69, p > 0.05 and flexibility F (1, 83) = 46.80, p < 0.05 while; insignificant for muscular strength F (1, 83) = 3.54, p > 0.05. Findings from The Healthy Lifestyle Program Manual National Service study
showed that there were significant reduction in weight before (N = 24.91, SD = 0.9) and after (N = 23.60, SD = 0.9) the intervention. Limitations for these studies include lack of randomisation in classes and non-compliance to progressive overload principle. In short, due to lack of longitudinal quasi-experimental research designs, physical activity intervention in Malaysia is still needed in order to support school-based physical activity initiating policies to promote more regular access to physical activity in school settings.

Poster Presenter 44

The Effect of Physical Activity on Sustained Attention: A Review

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Abstract:
Physical activity is known for its benefits to improve cognitive functions such as sustained attention. A preliminary review for physical activity effects on sustained attention articles using databases PubMed, ResearchGate, ScienceDirect and Google Scholar was undertaken. The date of these articles publication ranged from 2010 till 2017. There are total of nine studies of both longitudinal and cross-sectional studies were selected in this review. Most of the studies showed a positive relationship between physical activity and sustained attention. Future studies may consider a longitudinal study design to study the effect of physical activity on sustained attention in prolonged time, and the corresponding effect of gender, age, motivation and perceived arousal to investigate the relationship together with other possible factors that can affect sustained attention indirectly.

Poster Presenter 45

Secondary School Students’ Motivation for Participation in Athletics

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Abstract:
Purpose: The importance of participating in sports such as athletics in schools required a better understanding of the students motivation towards athletics. The purpose of the study was to examine the motives for participation in athletics among gender, age and locality. Methods: The participants were 632 students (349 males, 283 females) with a mean age of 15 + 1.28 years participated in the study. The SPSS 20.0 was utilised to analyse the descriptive statistics and independent samples t-test. The participants completed the Participation Motivation Questionnaire (PMQ); Gill et. al.(1983) that assess the eight reasons for participating in sports which was rated on a 3-point Likert-type scale. Results: The results has shown a significant difference between male and female students on fitness, friend, fun and situational motives in which male rated higher ratings on these motives. In addition, students in the older age group had higher ratings for learning, improving skills and friends. Conclusion: The study recommended that the influential significant others such as
coaches, parents and teachers have to be responsible in establishing a mastery environment conducive for personal development, choice and learning where it is fun, interesting and challenging to ensure a continuation in the students participating in athletics.

**Poster Presenter 46**

**Participation Motivation Among Secondary School Students**

Monica Mercy Anak Deru, Ting Pei Yi, Thiza Anak Rover, Affendi Bin Mustapha, Mohammad Affizzi Bin Affendy, Mohd Firdaus Bin Suhaili, Mohd Halif bin Waslee, Muhammad Hafiz bin Yusuf

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**Abstract:**
The purpose of the study is to determine the degree and rank order of expectancy beliefs, subjective task value, task and ego orientation, intrinsic, extrinsic and amotivation of the secondary school students participating in athletics. The participants comprised of 632 secondary school students (349 males, 283 females) with a mean age of 15 + 1.28 years. The expectancy beliefs and values measures, the Task and Ego Orientation in Sports Questionnaire (TEOSQ) and the Sports Motivation Scale (SMS) were administrated to the participants. Results revealed that students ranked subjective task values first and followed by expectancy-related beliefs. As for the TEOSQ, the students ranked task orientation first, followed by ego orientation which was ranked second. Whereas for the SMS, the students ranked intrinsic motivation first, extrinsic motivation second and amotivation third. These results will lead to a better understanding of the students motives in order to establish intervention programs that can sustain their participation in athletics and other sports.

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**Poster Presenter 47**

**The life event stress and mood of injured athletes**

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**Abstract:**
During sport or physical activity, athletes were increasing exposed to the risk of injuries. Many athletes experienced negative psychological response to injuries. The purposes of this study was to identify the life event related stress and mood states level among the injured athletes in a University College based on age, gender, year of experience, level of participation, types of injuries, severity of injury and duration of absent from sport. To date, there are no studies that both focus on the life event stress and mood states of injured athletes. A total of 62 (50 males, 12 females) injured participants volunteered in this study. Participants completed the Life Events Survey for Collegiate Athletes (LESCA) and Brunel Mood Scale (BRUMS) questionnaires. The demographic data consisted of age groups, gender, level of participation, years of participation, types of injury, severity of injury and duration of absent from sport after injury. The results of this study showed no significant difference (P >.05) on life event related stress (positive, negative and total life stress) and mood states (anger, confusion, depression, fatigue, tension and vigor) according to age groups, gender, level of participation, years of participation, types of injury, severity of injury and duration of absent from sport after injury. In conclusion, the results in this study indicated the importance of life stress and mood states of injured athletes.
**Poster Presenter 48**  
**Relationship between personality and physical activity participation**  
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**Abstract:**  
Personality has been shown to be associated with physical activity participation. The study aims to examine the relationship between personality and physical activity participation. This quantitative research employed the online survey method for data collection. A total of 205 students (117 males and 88 females; M age = 20.69; SD = 1.465) from Tunku Abdul Rahman University College, KL Main Campus participated in this study. Participants completed two inventories, which were the Godin-Shepard Leisure-Time Exercise Questionnaire (Godin & Shepard, 1985), consisting of 4-items with a reported \( \alpha = 0.97 \) and the Big-Five Inventory (John & Srivastava, 1999) that consisted of 44-items with a reported range of \( \alpha = 0.57 \) – 0.85 respectively. Additional demographic data collected were faculty, education level (program level and program year) and mode of physical activity (group and individual activities). Descriptive statistics on the students’ demographic data were analysed. Inferential statistics (Pearson product-moment correlation, Independent T-test and One-way ANOVA) were used to analyse the data. Correlation analyses revealed that both extraversion \( (r = 0.160, p = 0.022) \) and openness \( (r = 0.148, p = 0.034) \) has a positive correlation on physical activity participation. Results from the study showed that there were significant difference for Extraversion according to faculty \( (p = 0.020) \). As for Neuroticism according to gender \( (p = 0.035) \), mode of physical activity \( (p = 0.047) \), and faculty \( (p = 0.000) \). As for Openness it according to age-group \( (0.005) \). There was no significant difference for Conscientious and Agreeableness. This study indicated that personality does play a role or is one of the factors that attributes to physical activity participation.

**Poster Presenter 49**  
**Effects of 6-week imagery training on volleyball service performance among college volleyball players**  
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**Abstract:**  
The purpose of this study was to examine the effects of 6-week imagery training on overhead volleyball service among college volleyball players. A total of 34 volleyball players from a University College were recruited in this study. They were randomly assigned into control group (CG), imagery training group (ITG), physical training group (PTG) and combination group (IT+PTG). In addition to college volleyball training, ITG received 10-minute imagery training of volleyball overhead serve, PTG received 20 actual volleyball overhead serve, IT+PTG performed 10-minute imagery training of volleyball overhead serve, followed by 20-actual volleyball overhead serve while CG only participated in the college volleyball training. Russell-Lange Volleyball Serve Test \( (\alpha = 0.792) \) was used to assess the pre-test and post-test service performance. Comparison of the pre and post-test mean scores showed that ITG had 10% of significant improvement \( (t(7)=-4.217, p=0.004) \), PTG’s service performance improved 5% \( (t(7)=-1.033, p=0.336) \), IT+PTG had a significant improvement of 9.8% \( (t(7)=-3.65, p=0.008) \), while CG’s service performance decreased by
6.1%. The insignificant pre-test results \[F (3, 30) = 0.271, p=0.846\] showed the four groups started equal. Post-test results revealed differences among groups \[F(3, 30) = 8.342, p=0.001\]. Tukey-HSD results showed differences between CG (mean=30.5) and PTG (mean=35.9), CG and ITG (mean=37.4), and between CG and PT+ITG (mean=37.1). In conclusion, the present study demonstrated that imagery training alone and combination of imagery training and physical practice could help improving volleyball service performance more than physical practice alone.

**Poster Presenter 50**

**The effects of using synchronous and asynchronous music on active male runners’ mood states**

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**Abstract:**

The use of music in exercise and sports science has become the main interest in the field of psychology. In general, some people prefer running while listening to random music without considering the degree of synchronicity between the music and their body movement. The purpose of this study is to examine the ergogenic effects of using synchronous and asynchronous music on mood states in running. The participants were all active males performed shuttle run test protocol under three different conditions: without music, and running with music (synchronous and asynchronous). The results showed that participants reported higher positive mood (vigour) when running without music, the feeling of tension (negative mood) was significantly lower in asynchronous music than running with synchronous music, meanwhile the state of fatigue showed significantly much lower in asynchronised music than running with synchronised music. In conclusion, music can influence the mood states in running.

**Poster Presenter 51**

**The Effect of Using Virtual Reality Simulation as External Imagery Modelling on Competitive State Anxiety**

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**Abstract:**

Mental imagery is a mental technique that programs the mind and body to respond concurrently. However, there were limited studies that utilises virtual reality simulation as external imagery modelling for taekwondo players. By using virtual reality during training, it could help to enhance the athletes's performance by lowering their performance anxiety. The purpose of this study is to investigate the effect of virtual reality simulation as external imagery modelling on somatic and cognitive state anxiety. Competitive State Anxiety Inventory-2 (CSAI-2R) was employed to measure participants’ competitive anxiety level. 30 taekwondo athletes participated in this study. They were divided into three research conditions, namely control group (C), mental imagery group (MI) and virtual reality group (VR). The results showed that, virtual reality group (VR) has significantly reduced both somatic (p=0.003) and cognitive (p=0.025) state anxiety based on paired t-test. However, no significant difference found in both C and MI group for both somatic and cognitive state anxiety. Future research directions are suggested.
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