Relationship between Level of Physical Activity and Exercise Imagery among Klang Valley Citizens

Kok, M.O., Omar-Fauzee, M.S., Rosli, M.H.

Abstract—This study investigated the relationship between exercise imagery use and level of physical activity within a wide range of exercisers in Klang valley, Malaysia. One hundred and twenty four respondents ($M_{age} = 28.92$, $SD = 9.34$) completed two sets of questionnaires (Exercise Imagery Inventory and Leisure-Time Exercise Questionnaire) that measure the use of imagery and exercise frequency of participants. From the result obtained, exercise imagery is found to be significantly correlated to level of physical activity. Besides that, variables such as gender, age and ethnicity that may affect the use of imagery and exercise frequency were also being assessed in this study. Among all variables, only ethnicity showed significant difference in level of physical activity ($p < 0.05$). Findings in this study suggest that further investigation should be done on other variables such as socioeconomic, educational level, and self-efficacy that may affect the imagery use and frequency of physical activity among exercisers.

Keywords—Physical activity, exercise imagery, Exercise Imagery Inventory, Leisure-Time Exercise Questionnaire

I. INTRODUCTION

MENTAL imagery is defined as a rehearsal process that occurs mentally to generate perceptual experience in the absence of real stimulus [1]. In sport psychology, mental imagery is a psychological skill used by athletes for performance enhancement, arousal regulation, affective and cognitive modification and rehabilitation [2], [3]. However, sport is just one of the varieties of physical activity that uses imagery. Another type of physical activity that had been linked to the use of imagery is exercise. Since imagery had been proven to be an important intervention in sport for developing self-efficacy and enhancing performance, it might also be applicable for exercise behavior [4].

Unlike athlete, imagery used by exercisers is primarily based on three grounds: energy, appearance and technique [5]. Energy imagery refers psychological images related to boost of energy and ease of tension; appearance imagery is more to physical appearance of individual being lean, fit and healthy while technique imagery is associated with carrying out proper body positioning and form during the work out [6]. Imagery used in exercisers is different from athletes because athletes use imagery as performance enhancing technique while exercisers use it as motivation to attain desire exercise goal [5], [7], [8].

Functional equivalence is a term used to represent the overlap in brain activation caused by an action through imagery and actual execution of action [9]. When functional equivalence is applied to sport psychology, the PETTLEP model is developed. A study by [10] suggested seven practical considerations that formed the acronym of PETTLEP when implementing imagery interventions and they are Physical, Environment, Task, Timing, Learning, Emotion and Perspective. The Physical component of PETTLEP is the extent to which the physical nature of imagery reflects the actual situation. The environment element of the model refers to the physical surrounding in which imagery is performed. The Task is important to ensure the similarity of the task being imaged and the actual task being performed. The Timing element refers to the imagined performances to be carried out at the same pace as actual situation. The Learning factor of the model refers to the adaptation of imagery content so that it is on par with the stage of learning. The Emotion element proposes that imagery should include all emotions and arousal characteristically experienced during actual performance. The last element, Perspective refers to the way imagery is viewed – internally or externally, depending on the task of performer.

Of all the seven elements of PETTLEP, the Emotion component encourages the individual to try to experience arousal associated with the performance and this may result in a beneficial effect as it can help to improve self-efficacy [9]. Some researchers have reported that exercise imagery is more commonly used by frequent exerciser compared to those that exercise less frequently [5]. This might due to the positive correlation of exercise imagery with exercise motivation and self-efficacy suggested by [6]. When people use imagery, they imagine themselves being successful performing a skill and through this, efficacy expectation is developed and eventually leads to self-efficacy. Elevated self-efficacy induces the belief of their own capability to work out regularly and hence, supporting the researches that reported frequent exercisers use exercise imagery more than non-regular exercisers [11].

Kok, M.O. is a Masters student in the Department of Sport Studies, Faculty of Educational Studies, University Putra Malaysia (e-mail: mayooi_k@ gmail.com).

Omar-Fauzee M.S., is an Associate Professor in the Department of Sport Studies, Faculty of Educational Studies and Head of Sport Development, Sports Academy, University Putra Malaysia (corresponding author to provide phone:603-8947-1142;fax:603-89464278;email:msofian@putra.upm.edu.my).

Rosli, M.H. is a Research Officer in the Sports Academy, University Putra Malaysia. (e-mail: mhafiz@putra.upm.edu.my).

A. Research Problem

Physical inactivity had been an issue worldwide for quite some time as it led to the rapid emergence of illness such as obesity [12], [13], cardiovascular problem [14], and also Type II diabetes [15]. According to [16], the physical inactivity prevalence in Malaysia was as high as 60.1% in year 2006 with 55.4 % of men and 65.1% of women were physically inactive. Despite much of Malaysian population understand the importance and benefits of engaging themselves in physical activities, exercise participation among Malaysians are still lacking even though Malaysian government agencies and Non-Government Organization (NGOs) are putting in substantial amount of effort to promote exercise among society [17]. Thus, physical inactivity among Malaysian had lead to the increasing prevalence of obesity especially among the adolescents due to the sedentary life style [18].

The nature of imagery use had been correlated to exercise motivation and frequency but the lack of studies in this issue leads to limited literature on the effectiveness of exercise imagery as exercise motivation. Since research findings on exercise imagery are still lacking in Malaysia as well, therefore, such research will help to understand more about how the practice of exercise imagery influence the exercise frequency among population especially in Klang valley.

B. Purpose of Study

The main purpose of this study is to understand the correlation of exercise imagery with frequency of physical activity among Klang valley population. In addition, this study will also assess variables such as age, gender and ethnicity of participants in relation to the use of imagery and exercise frequency.

II. METHODOLOGY

A. Participants

This study was carried out in Klang valley area whereby questionnaires consisting Exercise Imagery Inventory (EII) and Leisure-Time Exercise Questionnaire (LTEQ) are randomly distributed to individuals at Faculty of Education in University Putra Malaysia, Myoga in Mid-valley Gardens, Assunta Hospital, Petaling Jaya, as well as through email. A total of 100 hardcopies where distributed out while 50 softcopies were sent out through email. However, only 24 respondents replied the email. Therefore, sums of 124 sets of data were analysed. Age of the participants range from 18 to 60 years old (*M = 28.92, SD = 9.34*). Among the 124 participants, 45 of them were males while 79 of them were females. These individuals consisted of 29 Malays, 79 Chinese, 14 Indians, 1 English and 1 Kadazan.

B. Instruments

The questionnaire was divided into three parts: demographic variables; the Exercise Imagery Inventory; and Leisure-Time Exercise Questionnaire (LTEQ).

C. Demographic Variables

Basic demographic questions such as age, gender and race/ethnicity were asked in the questionnaire.

D. Exercise Imagery Inventory

The EII is a 19-item self-report questionnaire that was used in this study to measure exercise imagery [19], [20]. In this study, a modification was done and the imagery frequency was measured on a 5-point Likert-type scale ranging from 1 (*rarely*) to 7 (*often*). This instrument consists of 19 questions and each question represents one of four different subscales: Appearance-Health (8 items), Exercise Technique (5 items), Exercise Self-efficacy (3 items) and Exercise Feelings (4 items). The reliability of EII was analyzed with Cronbach's alpha and resulted that this instrument has high reliability ($\alpha = 0.935$).

E. Demographic Variables

A three-item scale was developed by [21] to assess the frequency of participants engage in leisure-time exercise in a week of time. It is a valid and reliable instrument and the regularity of respondents engage in exercise is indicated through mild (minimal effort), moderate (not exhausting) and strenuous (heart beats rapidly) bouts of exercise for 20 minutes or more within a week [20]. Examples of mild exercises are yoga, archery, fishing from river bank, bowling, golf, easy walking; moderate exercises comprise of fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, popular and folk dancing; while strenuous exercises include running, jogging, hockey, football, soccer, squash, basketball, combat sports, vigorous swimming, vigorous long distance bicycling. A metabolic equivalent score (MET) was calculated by using the formula:

MET = 3 (mild) + 5 (moderate) + 9 (strenuous)

Higher values signify greater amount of exercise done in a typical week.

.

F. Exercise Imagery Inventory

Quantitative approach was used to study the possible relation of exercise imagery with frequency of physical activity of individuals who participated in this study. From the data collected, level of exercise imagery was categorized into three classes: low, average and high; while a quartile split was calculated from the MET score to categorize participants into three groups: inactive ($\leq$11 METS), moderate active (12-44 METS) and active ($\geq$45 METS).

III. FINDINGS

A. Descriptive Statistic

Table I shows the EII score which categorized into three different levels and presented together with the Mean and SD.

Sub-scale	Questions
Appearance-Health Imagery	1. I imagine a "fitter-me" from exercising
	2. I imagine a "leaner-me" from exercising
	3. I imagine being toned from exercising
	4. I imagine being healthier from exercising
	5. I imagine losing weight from exercising
	6. I imagine becoming more fit
	7. I imagine getting in better shape
	8. I imagine a firmer me from exercising
Exercise Technique	9. When I think about exercising, I imagine the perfect technique
	10. When I think about exercising, I imagine my form and body position
	11. When I think about exercising, I imagine doing the required movements
	12. I imagine the perfect exercise technique
Exercise Feelings	13. I imagine being more relaxed from exercising
	14. I imagine how I will feel after I exercise
	15. I imagine reducing my stress from exercising
	16. I imagine feelings associated with exercising
Exercise Self-Efficacy	17. I imagine completing my workout
	18. I imagine having the confidence to exercise
	19. I imagine having the confidence to complete my workout

Fig. 1 Example of EII subscale and questions [20].

TABLE I
LEVEL OF IMAGERY FROM EII SCORE

Level	Frequency	Percentage
High (43 and above)	119	96
Average (27-42)	5	4
Low (26 and below)	-	-
Total	124	100

Mean: 68.58
Std Deviation: 13.28

Besides EII score, MET score had also been grouped into three levels as showed in Table II.

TABLE II
LEVEL OF PHYSICAL ACTIVITIES FROM MET SCORE

Level	Frequency	Percentage
High (45 and above)	31	25
Average (11-44)	62	50
Low (10 and below)	31	25
Total	124	100

Mean: 30.79
Std Deviation: 27.52

B. Correlation

The main purpose of this study is to understand the relationship of exercise imagery with the intensity of physical activity. Correlation of both exercise imagery and intensity of physical activity is done using EII and MET score and result indicated a weak but significant correlation between those (EII and MET) two variables with $r = .332$, $p < 0.05$. However, age was found to be not correlated with both exercise imagery and intensity of physical activity as result showed $p > 0.05$.

C. Independent T-test

From the analysis of T-test, there were no significant differences in both EII and MET score with diversity between male and females as EII showed $t_{(122)} = 0.811$, $p > 0.05$ while MET showed $t_{(122)} = 1.386$, $p > 0.05$.

D. One way ANOVA

In this study, two ANOVA test was done. The first comparison done was between different races on EII and MET scores which had been summarized into Table III. Result had showed that there was significant difference in level of physical activity between races as $F_{(3, 120)} = 2.973$, $p < 0.05$. Another comparison between different groups of age on EII and MET score was analyzed and none of the group age showed significant difference for both EII and MET score as $p > 0.05$.

IV. DISSCUSSION

Assessment of EII score obtained from participants had reported that, all the participants had average or higher level of exercise imagery. When EII score is correlated with MET score that is an instrument used to assess exercise frequency of participants, result showed that there is significant but rather weak correlation with $r = 0.332$, $p < 0.05$. This result is has corresponded to previous study by [22], supporting his finding on the positive effect of exercise imagery on exercise behavior and it might be an indication that imagery can be a good practice to get people started with routine physical activities.

TABLE III
ONE WAY ANOVA ANALYSIS ON EII AND MET SCORE
BETWEEN DIFFERENT RACES

		n	Mean	Std deviation	F	p
EII score	Malay	29	71.17	10.92	.949	.419
	Chinese	79	67.25	14.31		
	Indian	14	69.42	11.46		
	Others	2	77.50	13.44		
MET score	Malay	29	28.03	25.49	2.973	.035
	Chinese	79	30.57	27.87		
	Indian	14	29.79	21.13		
	Others	2	86.50	45.96		

In the study of [4], frequent exercisers too have been found to use imagery more often especially for the appearance imagery (subscale of exercise imagery) and perhaps the linkage between exercise imagery and frequency is due to this factor. A study by [22] had mentioned that active individuals have stronger desire to improve their appearance and health. Thus, the possibility of the regular exercisers in use of imagery more often to help them achieve their goal is relatively high.

A T-test was done on gender of participants with the imagery and exercise frequency level. However, there were no significant differences when gender is taken into account, contradicting with previous study done on Malaysian athletes that suggested that males commonly showed better of imagery skills compared to females due to higher level of experience and physical fitness [23]. A possible explanation for this phenomenal is because instrumentation used in [23] was different from this study. Athletes were used as sample of their research and Sport Imagery Questionnaire (SIQ) was used to measure athletes' level of imagery. Such difference could lead to varies in outcome even though similar findings were carried out. However, there was still presence of dissimilarity when comparison was made with previous studies using the same instrumentation. It was found that measurement of imagery in this study was done in an overall view whereas previous studies assessed subscales of EII. In the 19 questions of EII questionnaire, it is further categorized into Appearance-Health Imagery, Exercise Technique, Exercise Feelings, along with Exercise Self-Efficacy. [20], [22] both had reported that males have greater technique imagery while females are better in appearance and health imagery, identifying the difference of gender in different subscales of exercise imagery. However, their studies did not point out which of the gender showed higher level of imagery as whole. Therefore, further investigation is needed to confirm the likelihood of variation in imagery level as whole and as in subscale when gender is taken into account.

In the ANOVA test which carried out to determine the influential of ethnicity on exercise imagery and frequency, variation in ethnicity did not show any difference in level of exercise imagery. Rather, significant difference in level of physical activity was found among different races. Insignificant difference in exercise imagery among different races may caused by uncertainty or lack of understanding in the use of exercise imagery as participants in this study are not athletes and they are not trained on how to use imagery during their workout. It is possible that the respondents in this study are actually using imagery when they exercise but due to lack of understanding on imagery, they are unaware of imagery usage in exercise imagery that lead to the insignificant of difference in findings. A reported by [24], in their study, the level of physical activity was not correlated with ethnicity but the mean physical activity score for both male and female for Malay and Chinese varied from each other. Cultural difference could be one of the reasons that is likely lead to the difference of level of physical activity in ethnicity as the Malays were in the fasting period when this study was carried out which could possibly explained why they are the lowest in terms of physical activity level among other races. However, difference among the Chinese and Indian was unexplainable due to the lack of studies on role of ethnicity in exercise frequency.

In this study, age was also another variable being used to test its influence on exercise imagery and exercise frequency. There was no significant difference showed in this study as compared to previous study that suggested elder participants had lower level of exercise imagery compared to the younger ones [7]. Different age groups also failed to associate any relation with level of physical activity in this study. It was found that the size of the sample used in previous studies were bigger compared to this study and that could be the possible factor that leads to inconsistent result with previous study. However, [20] did bring up an issue about age alone does not distinguish the usage of imagery in the individuals. He proposed to measure exercise imagery by using age-by-activity level interaction as his study reported significant difference in the use of technique imagery with the

combination of advanced age and reductions in exercise behavior.

The findings observed in this study showed most variables tested had low effect on outcome on exercise imagery and level of physical activity. There are a few limitations in this study that might have lead to such findings. Firstly, the sample size of this study is rather small compared to similar researches that had been done previously. Besides that, the sampling used are consist from participants that had not been trained on how to use imagery. Lack of understanding on exercise imagery might be one of the factors that affect the result of the study. Lastly, this study did not include the type of exercise performed by the participants that would possibly impact how one uses exercise imagery. The limitations mentioned above suggest that further investigation should be done on other variables that may be related to how individual use or apply exercise imagery. Other variables may include educational level, socioeconomic, marital status, type of activities performed by participants, self-efficacy level and goal of exerciser [20].

REFERENCES

[1] Taylor, J., & Wilson, G. S. (2005). *Applying Sport Psychology.* Champaign: Human Kinetics.
[2] Jones, L., & Stuth, G. (1997). The Uses of Mental Imagery in athletics: An overview. *Applied & Preventive Psychology, 6* , 101-115.
[3] Saedeghi, H., Omar Fauzee M.S., Jamalis, M, Abd-Latif, R. (2010). The Mental Skills Training of University Soccer Players. International Education Studies, 3, 81-89.
[4] Gammage, K. L., Hall, C. R., & Rodgers, W. M. (2000). More About Exercise Imagery. *The Sport Psychologist, 14* , 348-359.
[5] Hausenblas, A. H., Hall, C. R., Rodgers, W. M., & Munroe, K. J. (1999). Exercise Imagery: Its Nature and Measurement. *Journal of Applied Sport Psychology, 11* , 171-180.
[6] Giacobbi, P. R., Hausenblas, H. A., Fallon, E. A., & Hall, C. A. (2003). Even More About Exercise Imagery: A Grounded Theory of Exercise Imagery. *Journal of Applied Sport Psychology, 15* , 160-175.
[7] Gregg, M., & Hall, C. (2006). The Relationship of Skill Level and Age to the Use of Imagery by Golfers. *Journal of Applied Sport Psychology, 18* , 363-375.
[8] Omar-Fauzee, M. S., Daud, W. R., Abdullah, R., & Rashid, S. A. (2009). The Effectiveness of Imagery and Coping Strategies in Sport Performance. *European Journal of Social Sciences, 9(1)* , 97-108.
[9] Ramsey, R., Cumming, J., Edwards, M. G., Williams, S., & Brunning, C. (2010, August 14). *Examining the emotion aspect of PETTLEP-based imagery with penalty taking in soccer.* Retrieved October 6, 2010, from The Free Library: http://www.thefreelibrary.com/Examining+the+emotion+aspect+of+PETTLEP-based+imagery+with+penalty...-a0234228320
[10] Holmes, P. S., & Collins, D. J. (2001). The PETTLEP approach to motor imagery: A functional equivalence model for sport psychologists. *Journal of Applied Sport Psychology, 13* , 60-83.
[11] Munroe-Chandler, K. J., & Gammage, K. L. (2005). Now See This: A New Vision of Exercise Imagery. *Exercise and Sport Science Review* , 201-205.
[12] Reilly, J. J., L. Kelly, et al. (2006). "Physical activity to prevent obesity in young children: cluster randomised controlled trial." BMJ 333(7577): 1041-.
[13] Boyle, S., G. Jones, et al. (2008). "Physical activity among adolescents and barriers to delivering physical education in Cornwall and Lancashire, UK: A qualitative study of heads of PE and heads of schools." *BMC Public Health* 8(1): 273.
[14] Duncan, J. S., H. M. Badland, et al. (2009). "Combining GPS with heart rate monitoring to measure physical activity in children: A feasibility study." Journal of Science and Medicine in Sport 12(5): 583-585.
[15] Omondi, D.O., Walingo, M.K., Mbagaya, G.M., Othuon, L.O.A. (2010). Understanding Physical Activity Behavior of Type 2 Diabetics Using the Theory of Planned Behavior and Structural Equation Modeling. International Journal of Human and Social Sciences 5:3 2010.
[16] WHO. (2010). *WHO Global Info Base: Indicator.* Retrieved September 8, 2010, from World Health Organisation: https://apps.who.int/infobase/Indicators.aspx
[17] Yap, S. F., & Sabaruddin, N. A. (2008). An Extended Model of Theory of Planned Behaviour in Predicting Exercise Intention. *International Business Research, 1* , 108-122.
[18] Zalilah, M. S., Khor, G. L., Mirnalini, K., Norimah, A. K., & Ang, M. (2006). Dietary intake, physical activity and energy expenditure of Malaysian adolescents. *Singapore Medical Journal, 47(6)* , 491-498.
[19] Giacobbi, P. R., Hausenblas, H. A., & Penfield, R. D. (2005). Further Refinements in the Measurement of Exercise Imagery: The Exercise Imagery Inventory. *Measurement In Physical Education and Exercise Science, 9(4)* , 251-266.
[20] Giacobbi, P. R. (2007). Age and Activity Differences in Use of Exercise Imagery. *Journal of Applied Sport Psychology, 19* , 487-493.
[21] Godin, G., & Shephard, R. J. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Science, 10* , 141-146.
[22] Cumming, J. (2008). Investigating the Relationship between Exercise Imagery, Leisure-Time Exercise Behavior, and Self-Efficacy. *Journal of Applied Sport Psychology, 20* , 184-198.
[23] Rattanakoses, R., Omar-Fauzee, M. S., Soh, K. G., Abdullah, M. C., Choosakul, C., Nazaruddin, M. N., et al. (2009). Evaluating the Relationship of Imagery and Self-Confidence in Female and Male Athletes. *European Journal of Social Science, 10* , 129-142.
[24] Dan, S. P., & Nasir, M. T. (2008). Psycho-social Correlates of Physical Activity in Young Adolescents. *23rd Scientific Conference of the Nutrition Society of Malaysia* (p. 28). Kuala Lumpur: Nutrition Society of Malaysia.