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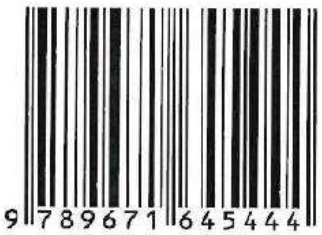

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Physical Competencies versus Physical Literacy Comparisons among Students

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Abstract
The main aim of this study is to compare the assessment of movement pattern competencies versus assessment based on the concept of physical literacy. The differences are physical literacy-based assessment includes physical competency domain and four other domains (motivation, confidence, physical competence, knowledge and understanding). Becoming physically literate with all basic's movement in strength training exercises is important especially for future exercise trainers or educators. Forty-five physical conditioning students (17 female and 28 male) had voluntarily participated for the purpose of this study. Participants performed five basic movements based on Movement Competency Screening (MCS) instrument (squat, bend-and-pull, lunge-and-twist, push-up and single-leg squat). Scores were then given based on newly developed *CelikFizikal Malaysia* (CFM-1) physical literacy assessment instrument's scoring system. Findings indicated that the physical competency level significantly differs from physical literacy level in all five movement patterns. Results also indicated that the majority of participants were motivated, have confidence, were knowledgeable and have an understanding of the proper technique of performing the movement pattern. Yet the majority of them were unable to perform all of the movements with adequate physical competence. In conclusion, being physically competence is not necessarily being physically literate and vice-versa. Physical trainers and educators may benefit more by applying physical literacy assessment as part of pre-participation and monitoring, rather than traditionally assessing physical competencies alone. Assessment based on the concept of physical literacy is more beneficial and suitable with the concept of lifelong education and application.

Keywords: physical literacy, physical education, physical conditioning, movement pattern, movement analysis

1.0 Introduction

Physical literacy has been accepted as having the motivation, confidence, knowledge, understanding and physical competence to perform physical activities (Whitehead, 2001, 2010). These domains of physical literacy are suggested as influencing lifelong practised of

physical activity for lifelong health and fitness purposes.

Movement competency screening involving the body weight squat, lunge-and-twist, push-up, bend-and-pull, and single-leg squat has been proposed, and widely used as a simple assessment tool assessing physical readiness for participation, in a strength and conditioning program (Kritz, 2012; Kritz, Cronin, & Hume, 2009). Physical conditioning students during their official educational process are normally taught and practically assessed on their ability to perform all of these basic movement patterns. Being physically competence and having the knowledge in all of these movement patterns can be considered as a pre-requisite for passing the physical conditioning-related courses.

The concept of physical literacy and its assessment so far seems to be more popular and researched by physical education fraternity, with almost exclusively involving only early childhood's fundamental movement skills (Giblin, Collins, & Button, 2014; Liu, Xiang, Lee, & Li, 2017; Longmuir et al., 2017; Lounsbery & McKenzie, 2015). Strength and conditioning practitioners and educators, on the other hand, seems more focus on movement competency in strength-related exercise or movement techniques (Comeau et al., 2017; Kritz et al., 2009; Lisman, O'Connor, Deuster, & Knapik, 2013).

The questions that now arise are, will it be more beneficial if instead of assessing physical competencies alone, any fitness clients or future physical trainers or educators be assessed their physical literacy level? The concept of physical literacy is said for lifelong application. Then the assessment should not be limited only to early childhood and fundamental movement skills such as walking, jumping, catching, etc. Utilizing the physical literacy concept with other sets of human movement patterns or skills may seems more logical in practical. This considering the fact that human movement skills and mobility ability fluctuate throughout their life span, depending on many factors such as aging, level of physical activities, types of training and many more (Batt, 2018; Mason & Maleszka, 2017; Tulle, 2018).

Thus, it is the main purpose of this study to investigate if physical literacy assessment output will differ from physical competencies output, and how future trainers under learning conditions will score in terms of their motivation, confidence, knowledge, understanding and physical competence domains.

2.0 Materials and Methods

2.1 Experimental Approach to the Problem

Five basic movement patterns normally involved in strength training exercise programming were selected to be used. The movement pattern involved were body weight squat, lunge, and twist, push-up, bend and pull, and single-leg squat. The movement patterns were originally from the Movement Competency Screening (MCS) instrument (Kritz, 2012; Kritz et al., 2009). The MCS were selected as it provides proper movement screening criteria based on proper scientific research, and can be used together with the CelikFizikal (CFM-1) physical literacy

assessment instrument (Mohamad, Othman, & Hamezah, 2018). CFM-1 provides general assessment guidelines and scoring systems for each domain of physical literacy (motivation, confidence, physical competence, knowledge and understanding). Participants attended one familiarisation session and one testing occasion. During the testing, participants performed each of the movement patterns. MCS movement pattern criteria for screening were used with CFM-1 scoring system.

2.2 Subjects

Forty-five students (17 female and 28 male) were recruited for this study. Participants' age was between 21 ± 0.30 years old, with a bodyweight of 59.76 ± 10.78 kg and a body height of 165.78 ± 8.10 m. Participation in this research was voluntary, in accordance with the ethical standards of the committee responsible for human experimentation and the Declaration of Helsinki of 1975 revised in 2008 (Association, 2014). Only healthy participants with no injury and enrolled in the physical conditioning-related classes at the Faculty of Sports Science & Coaching, Sultan Idris Education University during the time of the data collection were recruited.

2.3 Procedures

Each participant attended one briefing session and one testing occasion. The briefing session involves an explanation of the nature of the study, inform consent for voluntary participation in the study, and a brief conceptual introduction to the movement pattern involved. Injury records or physical readiness were determined using a pre-exercise questionnaire (PAR-Q) (Warburton, Jamnik, Bredin, Shephard, & Gledhill, 2018) during the same session.

The testing occasion took place after at least 48 hours of the briefing session. The gap period ensures each participant was tested when they were physically, emotionally and mentally ready and in fresh condition. The testing occasion started with the participant's standing in an anatomical ready position, and perform the movement based on instructions given by the researcher. The sequence f the movement pattern was all based on suggested sequences given in the MCS instruction. Each movement pattern performed by each participant were video-recorded for further analysis later. This ensuring the CFM-1 analysis will be done properly for each participant by the researcher. Verbal questions were asked during the performance of each movement pattern based on the CFM-1 instrument guideline.

2.4 Data and Statistical Analyses

Video-recordings were then analyzed with the assistance of the Kinovea motion analysis software (Whatman & Reid, 2017) to allow for angle measurement and determination of appropriate movement pattern competencies based on MCS criteria and CFM-1 scoring system. All data recorded in the CFM-1 form were then converted info numerical data as per CFM-1 guideline and transferred into Microsoft Excel (Bree & Gallagher, 2016) for further statistical analysis. Scoring points derived from the CFM-1 for each domain of physical literacy and each movement patterns were calculated and transformed into a percentage for ease of

understanding and equated scores comparisons. CFM-1 scoring system has 13 points full scores for each movement patterns. CFM-1 scoring system for movement competency domain alone has 5 points full scores for each movement pattern. Mean and standard deviations were calculated from it and produced as a representation of the centrality of the data. Shapiro-Wilk test for normality used indicated the normal distribution of data gathered. Paired sample T-Tests were used to compare physical competencies percentage of scores of each movement pattern alone versus overall physical literacy percentage of scores.

3.0 Results and Discussion

Statistical analysis performed indicated that the highest scores are all below 61% for all movement patterns. Interestingly participants had significantly scored higher points for physical movement competencies for all movement patterns in comparison to the physical literacy scores. As indicated in Table 1, this result seems to suggest that while participants can be physically competence in all of the movement pattern, this not necessarily means that they are physically literate in it (example motivated to do; have knowledge, have confidence and/or have understandings).

Table 1: Scores comparisons (mean ± standard deviation) between movement competencies alone versus physical literacy assessment based on CFM-1 scoring system for each of the movement patterns involved.

Movement Pattern	Movement Competencies (%)	Physical Literacy (%)	Sig.
Squat	59.11 ± 21.72	50.09 ± 12.98	0.000
Bend and Pull	44.00 ± 14.52	37.26 ± 11.12	0.020
Lunge and Twist	60.89 ± 19.98	48.55 ± 13.31	0.001
Push-up	60.44 ± 15.07	51.97 ± 8.06	0.001
Single Leg-squat	41.78 ± 15.27	35.56 ± 14.14	0.001

* *Significance level is a = 0.05*

If observed from the domain by domain point of view as indicated in Table 2, the majority of the participants did have motivation, knowledge, confidence, and understanding of each of the movement pattern. But when it comes to actual practical based competencies, only a few successfully performed it.

While looking at results presented in Table 1, it needs to always be remembered that the physical literacy scores also include the movement competencies scores in it. Thus, once all scores for all domains been counted and averages, the weak or lower scores in a certain domain may

negatively affect overall scores of physical literacy. The movement competencies domain scores were not omitted from overall physical literacy scores due to the reason that the concept and term of physical literacy must include all five domains. Without one of its domains, it cannot be considered as scores representing physical literacy.

Table 2: Percentage of participants passing each domain of physical literacy based on CFM-1 for each of the movement pattern involved.

Movement Pattern	Number of Participants Pass (%)				
	Motivation	Knowledge	Confidence	Understanding	Physical Competencies
Squat	82.22	97.78	82.22	93.33	66.67
Bend and Pull	68.89	82.22	68.89	55.55	22.22
Lunge and Twist	80	97.78	82.22	66.67	68.89
Push-up	88.89	84.44	91.11	95.56	80.00
Single Leg-squat	57.78	84.44	51.11	60.00	28.89

From Table 2 also it can clearly be seen that single-leg squat and bend-and-pull have the lowest percentage of participants that able to perform it appropriately (physical competence). It can simply be attributed to the weak physical strength of body parts needed for that particular movement pattern. And this is why the MCS typically used all of these movement patterns as an assessment to identify body parts and movements that needs to be trained. This result also indicated that an acceptable level of human movement and mobility can't only be achieved by having the motivation, knowledge, confidence, and understanding, without actually performing and training it. But in order to sustain lifelong physical fitness practice, physical literacy is needed.

4.0 Conclusions and Recommendations

In the end, it can be concluded that being physically competence is significantly differed from being physically literate. If educating people for lifelong physical fitness practices is the main aim, physical conditioning training alone is insufficient. It must be inclusive with all other types of programs which can motivate, educate, instil confidence and enhance their overall understanding. In terms of physical performance monitoring and pre-participation assessment, having a set of physical literacy-related assessment might be more useful than only assessing physical competence as traditionally been practices by many physical trainers and educators. And as for this study, participants were all physical conditioning students, which may or may not becoming

trainers and educators in the future. Results seem to suggest that they may have adequate theoretical competencies, yet lacking practical competencies.

Authors' Contributions

Nur Amirah Priencejaa Abdullah: Conceptual framework, methodology development, data collection, part of data analysis, part of manuscript preparation.
Nur Ikhwan Mohamad: Idea generation, conceptual framework, methodology development, part of data analysis, overall manuscript write-up and manuscript publication (corresponding author).
Thariq Khan Azizuddin Khan: Discussions for conceptual framework, proofreading manuscript.

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