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EVALUATION OF INTERACTIVE PHYSICAL ACTIVITY EDUCATION PROGRAM (IPAEP): A PRELIMINARY STUDY

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Abstract: *The purpose of this study was to evaluate changes in physical activity knowledge among university students after exposure to Interactive Physical Activity Education Program (IPAEP). In current globalization, physical inactivity or sedentary lifestyle becomes a major underlying cause of chronic diseases worldwide. There is a growing concern of inadequate physical activity levels among young adult especially university students. The acquisition and dissemination of physical activity recommendations through physical activity program are essential in the delivery of an adequate level of physical activity knowledge among university students Materials and Methods: A quasi-experimental study design was conducted, and data were collected using a questionnaire among students (n=116) of Universiti Malaysia Kelantan, to evaluate the changes of physical activity knowledge after exposure to IPAEP intervention. All of them participated in 10 weeks of IPAEP intervention. In the IPAEP intervention, students were exposed to interactive lecture and various online activities related to types, risks, benefits, and key recommendations of physical activity. Pre- and post-intervention survey were taking*

place before and after the program to evaluate the same measure, which is the physical activity knowledge. Data were analyzed using IBM SPSS version 25.0. Paired-sample t-tests were used to evaluate the differences between pre- and post-intervention of the physical activity knowledge scores. Result: The present study showed significant increment in physical activity knowledge score (P-value <0.001) among university students after participating in IPAEP intervention. Conclusion: Since the present study emphasized physical activity education for university students, the IPAEP could contribute to the better physical activity knowledge which eventually beneficial for their active lifestyle in the future.

Keywords: *Online Learning, Physical Activity, Knowledge*

Introduction

Despite distinct advantages of consistent physical activity for body health, many studies revealed that physical activity level among young adults were low and decline dramatically. National Health and Morbidity Survey (2015) indicated that Malaysian adults, which approximately 7.1 million or 36.9% of the adult population, aged 18 years to 59 years old, were physically inactive (Institute of Public Health (IPH), 2015). In another word, there were about 4 out of 10 adults, who were physically inactive in this country. Since university students are part of young adults, increasing the prevalence of physical inactivity among this group could not be negligible. The prevalence of physical inactivity among university students in the United States showed an increasing pattern, which showed that 46.7% of university students did not participate in any aggressive physical movement, and only 16.7% were physically active (Suminski, Petosa, Utter, & Zhang, 2002).

In Malaysia, many studies revealed that the prevalence of physical inactivity was high among university students (Mokhtari, Jamaluddin, & Saad, 2015; Rajappan, Selvaganapathy, & Liew, 2015; Yusoff et al., 2018; Hazizi, Hamdi, Leong, & Izumi, 2012). A study conducted by Yusoff et al., (2018) showed that 66.4% of 95 undergraduate students were classified as sedentary physical activity. Another Study by Goje et al., (2014) among 202 males and 692 females university students ranging from 18-25 years found that the prevalence of physical inactivity among the respondent was 41.4% and only 0.3% were involved in high physical activity level. Thus, based on current evidences showed most of the students in Malaysia are not physically active or not engage in any physical activities.

Inadequate physical activity is an alarming issue in many countries, which may lead to an increase in the prevalence of non-communicable diseases worldwide. Physical inactivity has been identified as the fourth leading risk factor for global mortality (6% of deaths globally). It is surpassed only by high blood pressure (13%), tobacco use (9%) and carries the same risk as high blood glucose (6%) (World Health Organization (WHO), 2009). The health status among young adults was reported to decline due to lack of physical activity, which increases the development of chronic diseases and mortality rates (Persson & Flodmark, 2017; Petersen, 2008). In the same vein, Lee et al., (2012) note that physical inactivity was accountable for 9% of worldwide premature mortality or 57 million deaths in the year 2008.

Problem Statement

The transition from home to university has often been identified to be a potentially critical period for physical inactivity among young adults (Pei Lin Lua & Elena, 2012). In the university, the students are often stressful because of many factors such as academic workloads,

monetary problems, and time-related issues (Misra & Castillo, 2004; Misra & McKean, 2000; Ross, Niebling, & Heckert, 1999). During studying and examination periods, students may decrease participation in physical activity that leads to an increase in sedentary time (Buckworth & Nigg, 2004; R. C. Plotnikoff et al., 2015).

Gaining knowledge is one of the first stages of a move towards a change of behaviour (Abula, Gröpel, Chen, & Beckmann, 2018). Physical activity knowledge is, therefore, an essential basis for an active lifestyle. Conversely, poor knowledge is one of the risk factors in increasing the prevalence of obesity and physical inactivity (Abula et al, 2018). Individuals who have good physical activity knowledge have a better attitude towards getting physically active in their daily life. The acquisition and dissemination of physical activity recommendations are essential in the delivery of an adequate level of physical activity knowledge among university students (Kumar, Jim, & Sisodia, 2011). Thus, physical activity intervention program for university students should be designed to increase physical activity knowledge and to produce positive physical activity outcome.

Recently, intervention studies in physical activity educations among university students to promote active lifestyles are constantly growing. Universities are potential setting to conduct physical activity intervention because it is possible to engage with a large numbers of yang adult population (Plotnikoff et al., 2015). Several studies found that lifestyle interventions have been successful in promoting and empowering individuals achievement by creating learning and support to improve physical activity and wellbeing of university students (Abu Moghli, Khalaf, & Barghoti, 2010; Reiner, Niermann, Jekauc, & Woll, 2013; Bonevski, Guillaumier, Paul, & Walsh, 2014; Grim, Hortz, & Petosa, 2011; Knight & La Placa, 2013; Plotnikoff et al., 2015). Furthermore, several studies showed a significant change in physical activity behaviour after physical activity interventions (Perveen, Raiz, & Khan, 2017; Sabharwal, 2015). A study by Ghaffari et al., (2013) indicated that educational intervention of physical activity was effective in increasing physical activity knowledge of students.

There are many studies conducted to assess the level of physical activity among university students but a little intervention studies was conducted to increase the physical activity knowledge of university students. Thus, the current study was purposely designed to evaluate the changes of physical activity knowledge after exposure to IPAEP interventions.

Research Framework

Figure 1 shows the research framework of IPAEP intervention that was adapted from Dali et al., (2017), Cavallo et al., (2012), and Lua et al., (2013). Align with the research framework, the objectives of this study were to assess changes of physical activity knowledge level and to evaluate changes of physical activity knowledge score, among university students before and after expose to IPAEP intervention. The implementation of IPAEP was useful to increase the level and the score of physical activity knowledge among university students.

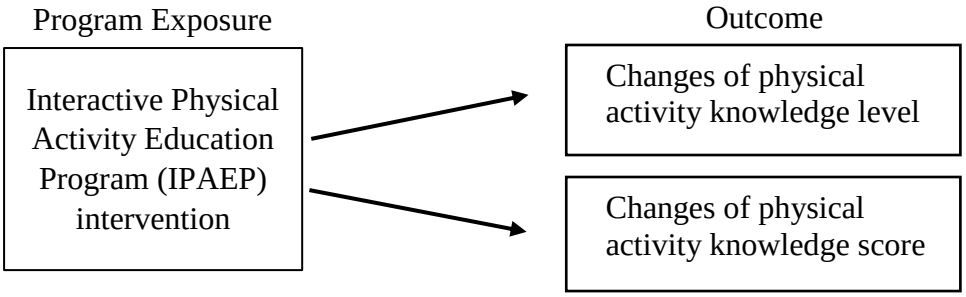

Figure 1: Research Framework of Interactive Physical Activity Education Program (IPAEP) Intervention

Materials and Methods

A quasi-experimental study was conducted at the Universiti Malaysia Kelantan, Kota Bahru, Kelantan, Malaysia from February until April of 2019. Participants were questioned up one week in advance of the intervention and ten (10) weeks thereafter. Randomisation was not performed because this study used a one-way repeated measures design. The lists of all available classes were gathered from head of department from University Malaysia Kelantan. A new sample of 140 students in Year 1 and 2 was recruited in this study. Of these, 24 participants did not complete the physical activity knowledge assessment during pre- and post-intervention, thus resulting in the final sample of 116 participants. The participants' ages ranged from 19 to 22 years. Participants were allowed to dropout from the trial with the reasons being noted and analyzed. All participants provided informed consent before taking part in this study.

Research Instrument

Physical activity knowledge questionnaire comprised of twelve (12) multiple choice questions. The physical activity knowledge questionnaire required participants to choose an answer from a list provided in the question. Each question has four answer options and a 'Not Sure' option; only one option is the correct answer. One (1) point was given for a correct answer and zero (0) point for an incorrect answer or 'Not Sure'. Thus, the possible maximum total score was 12 points and the possible minimum score was 0. Based on a study by Noor-Aini et al., (2006), for questions that have maximum score of 12 points, the students were categorised into poor (0-5, <50%), moderate (6-8, 50 <75%), and high (9-12, ≥75%) knowledge level. Content validity and face validity of the physical activity knowledge questionnaire were initially evaluated by two qualified researchers experienced in physical activity and were then pre-tested among 30 university students for clarity and readability. Subsequently, the contents of the questionnaire were modified based on the inputs and feedback obtained.

Interactive Physical Activity Education Program (IPAEP) Intervention

Interactive Physical Activity Education Program (IPAEP) is a program that has been designed to promote an active lifestyle among university students. In brief, this study was based on a quasi-experimental pre-post design with the overarching aim to evaluate the effectiveness of IPAEP intervention. This article, specifically, reports on the changes of physical activity knowledge associated with the program exposure. IPAEP was developed based on the "Key Massage 3" in the Malaysian Dietary Guidelines (MDG), which is Be Physically Active Every Day (National Coordinating Committee on Food and Nutrition (NCCFN), 2010). The key massage consists of four recommendations, which are; 1. "Be active every day in as many ways as you can"; 2. "Accumulate at least 30 minutes of moderate intensity physical activity

on at least five to six days a week, preferably daily"; 3. "Participate in activities that increase flexibility, strength and endurance of the muscles, as frequent as two to three times a week" and; 4. "Limit physical inactivity and sedentary habits" (NCCFN, 2010). The recommendations are applicable for healthy Malaysians over the age of two years. Very briefly, the students were encouraged to adopt this recommendation. The module of the program was delivered by a combination of interactive lecture and online-based learning. The program also provided students with current information and guidelines of physical activity.

Pre- and post- intervention survey were taking place before and after the program to evaluate the same measure, which is the physical activity knowledge. In the pre-intervention, at the beginning of the semester in February 2019, one-hundred and sixteen (116) students were given questionnaire on the physical activity knowledge and were then participated in 10 weeks of IPAEP intervention. Post-intervention was conducted immediately after the intervention. In the IPAEP intervention program, participants were scheduled for a one (1) hour lecture in a week's time from baseline, which they received an interactive physical activity lecture by a physical activity expert and also provided with written materials that contained information on the physical activity recommendations along with health-related benefits and examples of moderate to vigorous intensity of physical activity. The participants were also encouraged to increase physical activity through social media and related website. The participants were also received access to a dedicated website with educational materials. In the program, the participants were required to demonstrate active physical activity based on Malaysian Physical Activity Pyramid. In the post-intervention at the end of April 2019, ten (10) weeks after completing the baseline session, the level of physical activity knowledge was measured for the second time. Before the intervention, IPAEP was pre-tested with students and physical activity experts. A few minor changes were made regarding the text and material; however, there was a consensus that the intervention was both acceptable and user-friendly.

The educational design for IPAEP was designed to assist both students and lecturers from the beginning of the idea brainstorming session to the final project of the program. Therefore, by applying this educational design in every learning session, it enables both students and lecturer to be up-to-date with the changes in education system. In this program, students were exposed to interactive lecture and various online activities that related to types, risks, benefits and key recommendations of physical activity which are focusing on promoting active lifestyle. In this study, IPAEP Intervention was delivered in combination of interactive lecture and online-based leaning via Facebook, website and e-campus platforms. The students were also exposed to numerous online learning materials, online activities and online assessments. The constructive integration of numerous online applications such as PowToon, Popplet, Padlet, Quizizz and many more as a medium for teaching and learning were believed to be able to evoke students' creativities as well as to provide the flexible and conducive study environment. The educational design of Interactive Physical Activity Education Program (IPAEP) was shown in **Figure 2**.

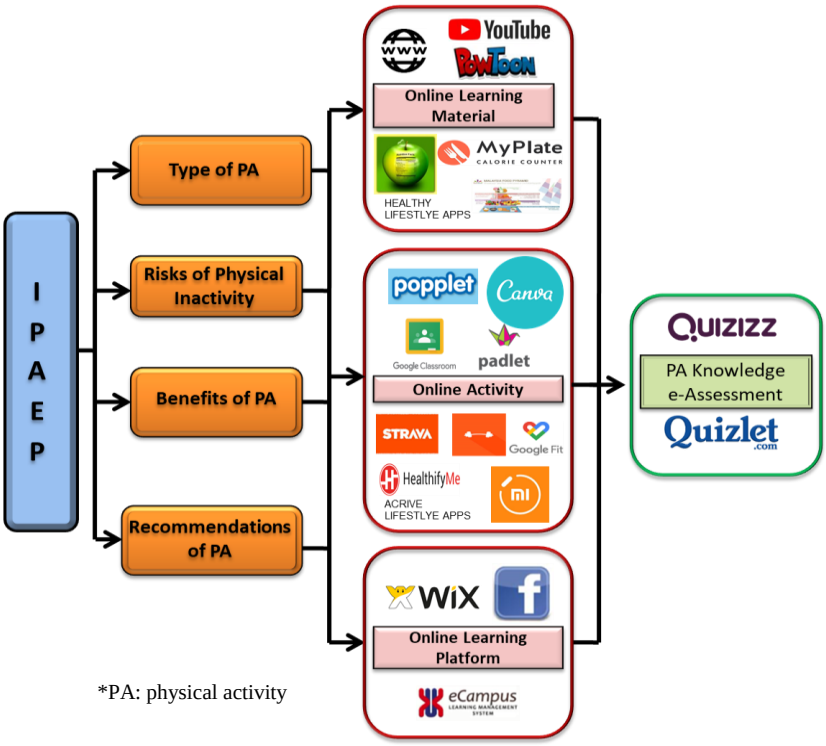

Figure 2: Educational Design of Interactive Physical Activity Education Program (IPAEP)

Data Analysis

The IBM Statistical Package for Social Sciences (SPSS) version 25.0 for Windows was used for statistical analysis. Descriptive statistics were used to demonstrate the socio-demographic characteristics and the level of participants knowledge. For hypothesis testing, paired-sample t-tests were used to evaluate the differences between pre- and post-intervention of participants' knowledge scores. The level of significant 0.05 was set for statistical test.

Results

Table 1. showed the demographic information of the participants in view of gender and ethnicity. The data expressed as frequency and percentage. The present study revealed that majority of the participants were female (75%) and Malay religion (75%).

Table 1: Demographic Information of The Participants

Variable	n (%)
Gender	
Male	29 (25.0)
Female	87 (75.0)
Total	116 (100)
Ethnicity	
Malay	87 (75.0)
Chinese	15 (12.9)
Indian	14 (12.1)
Total	116 (100)

The present study showed participants with poor knowledge level (score <50%) were reduced from 69% (n=80) at pre-intervention to only 14% (n=16) at post-intervention whereas participants that had high knowledge level (score >75%) were increased from 0.9% (n=1) at pre-intervention to 29.3% (n=34) at post-intervention. Meanwhile, participants with moderate knowledge level (score 50-74%) were increased from 30.1% (n=35) at pre-intervention to 56.7% (n=66) at post-intervention. Overall, participants that correctly answer at least 50% increased from 31% (n=36) at pre-intervention to 86% (n=100) at post-intervention. **Figure 3.** showed the frequency and percentage of knowledge level for pre- and post- intervention of IPAEP.

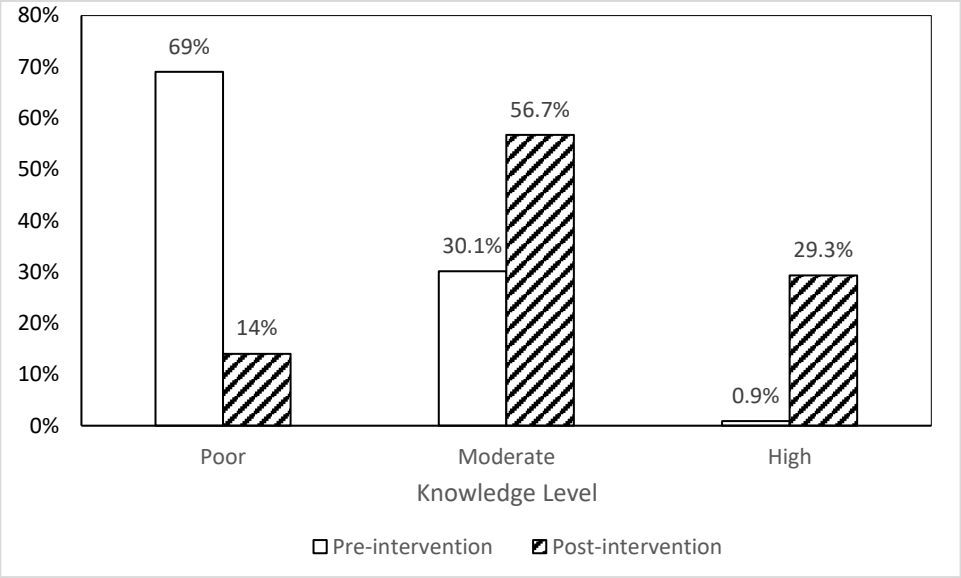

Figure 3: Knowledge Level for Pre- and Post- Intervention of IPAEP

The present study found that knowledge score of the students was improved significantly from 4.83 ± 1.47 to 7.46 ± 1.87 (***P***-value <0.001) after the IPAEP intervention. The total mean difference of physical activity knowledge before and after the intervention was 2.63. The present study showed that IPAEP was effective in improving the physical activity knowledge of students. **Table 2**. showed the Mean (SD) of knowledge score for pre and post IPAEP intervention.

Table 2: Knowledge Score for Pre- and Post- Intervention of IPAEP

	Pre-Intervention Mean±SD	**Post-Intervention Mean±SD**	**Mean Difference (95% CI)**	***t*-value**	***P*-value**
Physical activity knowledge score	4.83 ± 1.47	7.46 ± 1.87	-2.63 (-2.85, -2.41)	-23.64	<0.001 *

*Difference is significant at the 0.05 level (two tails)

Discussions

The present study showed a significant improvement in physical activity knowledge after IPAEP intervention. According to Abula et al., (2018), the present results suggest that

increasing in physical activity knowledge could be an effective cognitive strategy to develop and strengthen intentions to physical activity behaviour (Abula et al., 2018). Cameron et al., (2007), Plotnikoff et al., (2007), and Abula et al., (2018) found that those who were aware of the physical activity recommendations, were being significantly more physically active than those who were not aware of the recommendations. A study by Tabatabaei et al., (2012) on the effect of physical activity education revealed a significant increase in the knowledge mean score after the educational intervention. Furthermore, a study by Caperchione et al., (2016) showed that high exposure intervention group scored significantly higher in physical activity knowledge compared to low exposure intervention group. The study also reported significantly more minutes walked place to place and on minutes walked for leisure in the high exposure intervention group compared to the low exposure intervention group (Caperchione et al., 2016).

It is commonly understood that an active lifestyle among students are important for healthy growth and development. The IPAEP intervention was found to be effective in significantly improving physical activity knowledge of university students. The present study is in line with previously reported evidence that showed a positive influence on physical activity after the intervention program (Abula et al., 2018; Loughlan & Mutrie, 1997). A study by Ghaffari et al., (2013) showed the effectiveness of the educational intervention, consequently increased physical activity knowledge and improved attitude of students in the experimental group compared with the control group. Besides that, a study by Abula et al., (2018) showed a significant proportion of participants who were in the poor score level of physical activity at pre-intervention advanced to a later level which is moderate and high physical activity after the educational intervention. A study by Ghaffari et al., (2013) also indicated that educational intervention of physical activity was effective in increasing physical activity knowledge of students. Furthermore, a study by Lua et al., (2013) among university students showed education intervention has a positive influence on physical activity outcomes.

Moreover, the IPAEP educational design that used the combination of interactive lecture and online-based learning had contributed to the improvement of knowledge scores of the students. The use of online platform to deliver physical activity intervention has several advantages as it is possible to increase engagement through the use of interactive methods such as video streaming and sharing resources (Epton et al., 2014). Besides that, many studies have confirmed that positive impact and acceptance of the combination of interactive lecture and online-based learning among university students (Edmunds, Thorpe, & Conole, 2012; Poon, 2013; Smith, Smith, & Boone, 2000). A study by Cavallo et al., (2012) on physical activity social media support intervention partly administered through Facebook had proved that a significantly increased physical activity over time among participants after exposed to the intervention. Another study by Okazaki et al., (2014) showed students in the intervention group that use internet-based physical activity program, exhibited significant increases in energy expenditures compared with no-treatment control group. Furthermore, a study by Parrott, et al., (2008) on implications for an email-based physical activity intervention among sedentary college students revealed that the level of exercise behaviour in intervention group were higher compared to control group. Previous studies have also reported that online-based physical activity education showed positive relationship towards to encourage healthy behaviours (Cavallo et al., 2012; Okazaki et al., 2014).

There are several limitations to acknowledge in this study. First, the study was limited by a small sample size. Second, given that the purpose of the study was to pilot the effectiveness of a newly developed intervention, power calculations were not conducted a priori. Third, the study did not include randomization or a control group. Therefore, a true causal effect regarding

the IPAEP intervention cannot be determined (Caperchione et al., 2016). Lastly, it should be acknowledged that the study design had a relatively no follow-up period. Without a subsequent follow-up, it is unknown whether the declines in physical activity knowledge are sustained throughout the academic year (Kwan et al., 2013). Objective measures of physical activity practice (i.e. pedometers, accelerometers) should be considered in the future.

Conclusions and Implications

Since the IPAEP emphasized in educating university students on the importance and recommendations of physical activity as well as impact of physical inactivity, the program is very useful to encourage university students to be physically active every day. Furthermore, the current study could contribute to a better knowledge of physical activities, which eventually beneficial for their active lifestyle in the future. The results of the current study are promising because increasing knowledge of physical activity may thus contribute to increased physical activity behaviour. University should consider increasing efforts to raise awareness through physical activity education as well as further enhance programs that encourage university students to increase their physical activity. The IPAEP may have an even greater impact when program exposure is augmented with environmental and policy changes in the university. More effective public health campaign strategies are needed to raise the awareness of active physical activity among university students.

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