Development and validation of an instrument to assess quality physical education

Walter King Yan Ho , Md. Dilsad Ahmed & Klaudia Kukurova |

Published online: 07 Jan 2021.

Submit your article to this journal ⬚

Article views: 59

View related articles ⬚

View Crossmark data ⬚

cogent education

*Corresponding author: Klaudia Kukurova, Faculty of Education, University of Macau, Macao
E-mail: klaudiakukurova@um.edu.mo

Reviewing editor:
Sammy King Fai HUI, Curriculum & Instruction, The Education University of Hong Kong, Hong Kong

Additional information is available at the end of the article

EDUCATIONAL ASSESSMENT & EVALUATION | RESEARCH ARTICLE

Development and validation of an instrument to assess quality physical education

Walter King Yan Ho[1], Md. Dilsad Ahmed[2] and Klaudia Kukurova[1]*

Abstract: It is important to identify suitable parameters to measure and assess the quality of physical education. This paper aims to understand such measuring tool by focusing on professional perceptions and areas of concern of quality physical education (QPE). The research survey includes data gathered from 799 professionals in 11 cities in Asia. These professionals had experience working at primary schools (n = 155), secondary schools (n = 249), and universities (n = 395). To examine professional perceptions of quality physical education, at the preliminary stage of this study, 65 potential items were identified; of these, 48 items on 8 dimensions were retained, following an exploratory factor analysis. The 8 dimensions covered *skill development and bodily awareness* (α =.935), *facilities and norms in PE* (α =.932), *quality teaching of PE* (α =.923), *plans for feasibility and accessibility of PE* (α =.824), *social norms and cultural practice* (α =.825), *governmental input for PE* (α =.859), *cognitive skills development* (α =.920), and *habituated behaviour in physical activities* (α =.933). These factors indicated excellent internal consistency and model fit, enabling the construction of highly relevant statements to measure professional perceptions of QPE.

ABOUT THE AUTHOR

Walter King Yan HO The authors are researchers in physical education who are interested in investigating, developing and improving the quality works of physical education. The present data were collected from professionals in Asia. Their perception on Quality Physical Education (QPE) helped to construct this paper and at the same time encouraged the team to work on another project called Global Index of Quality Physical Education recently. The team needs to thanks for the kind assistance from ISCPES, FIEP, IAPESGW and IFAPA. Without their help and contribution, it is not able to arrive on current result. The team expects to have more papers written under the topic of QPE in the shortcoming time.

Walter King Yan Ho

PUBLIC INTEREST STATEMENT

The movement for quality development in physical education (PE) has received attention as there is the demand to increase opportunities for exercise and sport in schools. A group of scientists decided to launch the research works on Quality Physical Education (QPE) with purpose to identify necessary dimensions that would help to develop the framework for quality development of PE. This study presents the instrument based on the perception of QPE from professionals in Asia. This study opens the systematic opportunities in investigating the knowledge about QPE, consensus in investigation and potential work of improvement in countries. The study also identified the possibilities of instrument for measuring QPE in the coming time.

1. Introduction

Almost four decades have passed since the International Charter of Physical Education and Sport was first approved by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in (UNESCO, 1978). The Movement for Quality Development of Physical Education (PE) was created to explore issues ranging from human rights to the development of curricula, teaching, sport coaching, professional training, research and international collaboration, and related policy making. The follow up works such as the *Magglingen Declaration and Recommendation on Sport and Physical Education* presented at the 1st International Sport and Development Conference (Sport and Development 1st International Conference, 2003); the National Association for Sport and Physical Education (NASPE)'s *National Standards for Physical Education* (National Association for PE and Sport [NASPE], 2004); the *UNESCO Report on Quality of Physical Education and Sport* (UNESCO, 2005); the Centers for Disease Control and Prevention (CDC)`s *Strategies to Improve the Quality of Physical Education* (Centers for Disease Control [CDC], 2010); and UNESCO`s recent *Quality Physical Education—Guidelines for Policy Makers* (UNESCO, 2015) provide rich resources, enabling policymakers to construct a basic framework for quality development in physical education. Other worldwide organisations, including the International Committee of Sports Pedagogy (ICSP) and the Working Group of International Council of Sports Science and Physical Education (ICSSPE) have shared the *Position Statement on Physical Education* (International Council of Sport Science and Physical Education [ICSSPE], 2010) and *Benchmarks for Physical Education Systems* (International Council of Sport Science and Physical Education [ICSSPE], 2012) to enhance the quality development in PE. These establishments promote PE and sport learning as a human-rights issue urging governments and international communities to allocate resources to improve the quality development of PE in schools.

Quality physical education (QPE) has appeared in the UNESCO document in (UNESCO, 2005). It was defined as a planned, progressive, inclusive learning experience that forms part of the curriculum during the early years of primary and secondary education in the QPE guides for policy makers (UNESCO, 2015). Thus QPE acts as a foundation for lifelong engagement in physical activity and sports. Learning experiences offered to children and young people through PE must be developmentally appropriate to help them acquire psychomotor skills, cognitive understanding, and the social and emotional skills they need to lead a physically active life. The overarching aim of QPE in schools is to establish the habit of lifelong engagement in physical activity and sport during the early years of primary and secondary education (UNESCO, 2015).

Although QPE has received wide support, implementing it is not a simple task. There are many interwoven issues to address, including the lack of need for a quality-measurement tool to assess physical education programmes, the debate over making physical education compulsory for all children without discrimination, inadequate time allocation, staffing issues, governmental support, and the need for official recognition of the subject. Overall, there is much challenging work to be done. Environmental, cultural, and economic conditions, and the educational background both facilitate and act as barriers to PE programme. When nations decide to reform their PE programmes, the development process can be difficult. Ruscoe (1969) highlighted the difficulties associated with educational development in developing countries, arguing that a nation's education system must be ready for reforms in order to succeed and be functionally suitable. Critical issues that arise during the development of QPE must be dialectically analysed. More information, and a greater understanding of these underlying issues would strengthen methods of developing a comprehensive framework for QPE research and development (Marshall & Hardman, 2000).

In 2013, four international associations of the International Society for Comparative Physical Education and Sport (ISCPES), Fédération Internationale D`éducation Physique (FIEP), the International Association of Physical Education and Sport for Girls and Women (IAPESGW), and the International Federation of Adapted Physical Activity (IFAPA)—launched a comprehensive research project on QPE. A questionnaire was designed, focusing on issues related to the general perception of QPE, QPE in learning, and supporting issues in QPE development. The questionnaire

was distributed in 2014 and data collection was completed in 2015. More than 1609 professionals in the field of sports and PE from Asia, Europe, and Latin America completed the questionnaire. Readers can have the understanding of this research through number of publications from 2017 to 2019 (Ho et al., 2019a, 2018, 2019b). Although there is a number of publications, the research team is aware of the insufficiency in focusing the discussions on perceptions of QPE as a whole process of PE. A comprehensive understanding is important if there is the need to develop the tool to investigate the QPE issue. Therefore, the present study took the decision to analyse the 65 items, and screened statements with potential relevance to further research on QPE.

Unlike data collected in Latin America and Europe, where most cities shared similar economic circumstances and developmental prospects in physical education, the sample used in the present study was drawn from cities with diverse educational, economic, religious, and socio-cultural backgrounds. This background information has been discussed in papers published between 2017 and 2019 (Ho et al., 2019a, 2018, 2019b; W.K.Y. Ho et al., 2017). Meyrick's (2006) study provides support for this decision, as good research must cover a comprehensive range of evidence; intersecting conditions help to define and outline what to research. A data structure that incorporates diversified circumstances can provide substantial results for the research and study of QPE.

2. PE in Asia

The development of PE in Asia was deeply affected by colonial influences, which are very different from Western culture traditions (Ho, 2007a). Recent debates about the development of QPE programmes in Asia have focused on concerns about methods of effectively developing curricula, instruction, assessment, and academic learning time, as well as ways of improving infrastructure and support systems, including facilities, resources, and professional education. In attempting to address these issues, educational authorities in Asia have focused on different areas. For example, the Education Department of the Hong Kong SAR government launched its Key Learning Area Curriculum Reform in Hong Kong in 2000. This reform focused on Learning to Lean in Education (Curriculum Development Council (CDC), 2000). The Oxford Business Group held a discussion on educational reform in Thailand, in which Standard-Based Education was described as the focus of the 2008 reform (Oxford Business Group, 2008). These reforms highlight a focus on areas that are essential for increasing key achievements in society. However, in achieving such reforms, development cannot focus exclusively on educational arrangements, but it must also consider other elements holistically. McNeill et al.'s (2008) discussion of QPE in Singapore highlights problems with QPE development, listing difficulties with staffing, the duration of PE lessons, and class size as constraints on the success of QPE development. In China, despite the government's focus on offering QPE to children, it is common to have 50–60 students in a single class; in fact, 80 students per class is the norm (Wang et al., 2009). In addition to the large number of students, researchers have shown that a lack of adequate space and PE equipment, and time-allocation problems make it difficult to improve quality (Wang et al., 2009). Gender inequality in PE and sports has been found in the Middle East and Asia. In Bahrain, traditional barriers and parental disapproval discourage girls from participating in PE lessons; in Taiwan, cultural bias and a lack of facilities, equipment, and resources hinder PE development (Holzweg et al., 2013). Each country has its own regulations and strategies for maintaining the PE curriculum. In India, as in other developing countries, professionals are striving to make PE a compulsory subject (Confederation of Indian Industry (CII), 2017). By contrast, in developed cities such as Macau, although PE is a compulsory subject, teaching quality, time allocation, class assessment, funding, and skill-based learning are among the areas that need proper attention (Ho, 2007b). In China, the impact of traditional culture, social recognition of the profession of PE teachers, students' understanding of the importance of PE, and other factors have determined the status of Chinese school PE (C. Jin, 2016). Based on a qualitative survey of eighteen teachers, A. Jin (2013) has identified a number of structural, personal, and cultural factors that may prevent PE teachers from actively implementing the new health-based physical-education curriculum. In the Philippines, located in the Pacific Ring of Fire and typhoon belt, the unstable natural environment poses a disadvantage for QPE. Although the country has

a robust education sector, some regions, including parts of the island of Mindanao, are riddled with conflict and poverty, which frequently disrupt the school calendar, and cast doubt on whether the state can implement QPE, based on UNESCO recommendations (Lorraine, 2013; UNESCO, 2015). These concerns, alongside purpose-driven development, give physical education a diversified structure and unique qualities. These influence the development of a comprehensive range and intersected conditions, shaping the multidimensional outline of what to research.

3. Current research

While considering methods of investigation, McNeill et al. (2008) indicated the interrelationship of qualified professionals, class size, and curriculum time as major constraints in maintaining QPE in Singapore schools. Hardman (2009) indicated the differences between countries regarding curriculum design, the status of PE in primary and secondary schools, instructional time allocation, and general practices in PE. These studies provide some insight into the background and status of PE, but no attempts have been made to determine the actual concerns of professionals' perception and satisfaction with the quality issues of PE. The only information that Hardman's research provides are the means, standard deviations, and frequencies (percentages) instead of the current status of PE assessed through a validated scale. Valid and reliable measures of perceptions of QPE may help foster a discussion of whether QPE has been achieved in the schools of various countries. Therefore, in this study, PE professionals working at schools (primary and secondary) and universities from Asia were invited to participate. While designing this study, it was considered that without knowing the concerns of the professionals dialectically, it would be difficult to identify a proper focus for developing quality PE in schools. More specifically, these participants were invited because they are educated, they have earned qualifications in relevant fields, they have an understanding of the profession, and they are the ones who implement PE policies at the ground level. Thus, understanding their perspective and taking their inputs could lead us in the right direction. This study could help to develop a comprehensive and productive programme to facilitating the involvement of students in structured PE programmes in Asia. Consequently, the research question is as follows: How to assess QPE in Asian schools based on the professional's perception and what are the factors that underprint professionals' perception of QPE? Therefore, in its overarching design, this study aims to develop a valid and reliable tool to take stock of what has been achieved, and to examine how professionals perceive the quality of PE in school settings. The study investigates how QPE is understood and practised by professionals, developing a framework for assessing the QPE in schools.

4. Methods

4.1. Participants

The data collection work was assisted by researchers from different cities. Overall, 799 professionals from 11 Asian cities participated in this study (Tables 1 and 2). All of the invited participants were primary- or secondary-school PE teachers, professionals working in the field of physical education in universities and government-educational authorities, or school supervisors responsible for developing the PE curriculum. They were recruited during local seminars, meetings, and training activities in 2014 to 2015. The participation of these professionals at the seminar and completion of the questionnaire were voluntary as well. After introducing the aim and purpose of the current study to participants, they chose or not to participate in the research. If participants agreed with purpose of the research and wanted to participate, they were asked to sign consent form before completing the questionnaire. Only participant who signed the consent form were included in the study.

5. Questionnaire language

The questionnaire with 65 items including the consent form, information on gender, job position, years of work experience and demographic-information questions was designed in English. The items in the questionnaire were written in simple English and assumed that the participants would have no difficulty understanding the items. When participants filled up the questionnaires, it was

Table 1. Number of participants in the QPES survey in Asia with respect to their city, professional status and years of work experience

Country (City)	Primary School PE Teacher			Secondary School PE Teacher			Other PE Teachers			Work experience in years, Total		
	M	SD	N	M	SD	N	M	SD	N	M	SD	N
Macau SAR	4.31	2.56	18	9.06	4.76	18	11.67	7.29	24	8.68	6.22	60
Taipei	10.25	5.97	16	10.27	7.00	66	6.29	6.58	17	9.59	6.88	99
Kobe	10.00	5.23	7	10.59	5.07	22	8.02	6.08	58	8.83	5.84	87
Tel Aviv	6.75	1.71	4	10.67	1.53	3	14.90	2.38	10	12.24	4.05	17
Seoul	8.20	6.56	15	11.55	7.92	20	13.64	8.90	39	11.97	8.38	74
Changsha	5.00	3.46	7	10.36	8.29	25	6.41	6.52	58	7.40	7.08	90
Chengdu	9.92	7.91	24	14.36	10.99	21	5.90	6.99	40	9.12	8.97	85
Teheran	10.10	6.35	20	10.15	7.62	20	10.88	6.08	40	10.50	6.48	80
Kuala Lumpur	8.59	7.39	17	6.65	4.73	20	8.39	6.20	46	8.01	6.13	83
Amravati	6.85	2.39	20	7.12	3.85	26	9.45	9.22	37	8.09	6.69	83
Mawari	3.71	1.70	7	7.75	7.74	8	10.50	9.55	26	8.80	8.63	41
Total	8.04	5.95	155	9.96	7.14	249	9.07	7.55	395	9.15	7.2	799

Table 2. Gender-based descriptive information of participants with respect to their professional status and years of work experience				
		Years of work experience		**Total**
	Professional Status	M	SD	N
Male	Primary School PE Teacher	8.60	6.4	105
	Secondary School PE Teacher	9.97	7.1	145
	Other PE Professionals	9.01	7.6	250
	Total	**9.20**	**7.2**	**500**
Female	Primary School PE Teacher	6.86	4.9	50
	Secondary School PE Teacher	9.96	7.3	104
	Other PE Professionals	9.19	7.5	145
	Total	**9.07**	**7.1**	**299**

normally done in group setting, like having class together. The researcher would help to guide the participants in completing the questionnaires by, for example, explaining the different terms when in difficulty of understanding. The researcher was native speaker in the participant`s language and fluent in English language and was informed beforehand in the aim and scope of current study. This procedure ensured that the participants understood the meaning of the questions correctly and could freely reply according to their perception/opinions. Participants who still had difficulty understanding and answering the questions were eliminated from the sample before the analyses were conducted.

5.1. Ethics statement

After project approval was granted by the first author's institution, the principal investigator (PI) discussed the methodology and aims of the study with co-authors and colleagues from the PI's workplace. This study has followed the Helsinki Declaration of 1975. The co-authors subsequently discussed the research with their own universities to obtain permission to proceed, and with other universities/schools in their cities to collect data from identified professionals.

5.2. Procedure

Participants were recruited from among PE professionals from early 2014 to mid-2015; participation was voluntary. Information sheets were distributed to all the participants. Since the participants read a detailed information sheet before filling out the questionnaire, completion of the questionnaire was assumed to indicate consent.

5.2.1. Item generation and content validity

An instrument, known as the Professional Perceptions Toward Quality PE (PPTQPE), was developed for this study, based on the reviewed research of Song and Chen (2012), Arar and Rigbi (2009), Subramaniam and Silverman (2007), Guan et al. (2005), and Keating and Silverman (2004). The instrument was verified using a content validity procedure suggested by Lynn (1986). Existing instruments were not considered, as most were constructed within a specific cultural environment; this can create idiosyncratic problems, due to the formulation of items related to the specific culture (Poortinga, 1989). To develop the questionnaire, the research group used references drawn from the guidelines on *QPE* developed by the National Association for Sport and PE in 2004, the 2005 UNESCO report on QPE, the ICSSPE 2010 International Position Statement on PE, and the ICSP's preliminary work to develop international benchmarks for PE systems (International Council

of Sport Science and Physical Education [ICSSPE], 2010). The content validity of the professional perceptions of QPE in schools (QPES) were evaluated to determine whether all important aspects were covered, identified, and essential; items that were not desirable in specific construct domains were excluded (Straub et al., 2004). The study adopted the two-stage content-validity process developed by Lynn (1986), which included developmental and judgement stages.

5.2.2. Developmental stage—developmental stage
The first stage focused on defining professional perceptions of QPE, generating content domains for each component, and developing an item pool for each domain. Two methods were used to generate the content domains and relevant items. The first method pooled relevant items from previous studies, and then generated new items. The second method was initiated by gathering items and domains from target respondents. By using both methods to generate content domains and the items in each domain, this study ensured that all relevant items and possible content domains were considered at the beginning of the instrument-development process (Keating & Silverman, 2004). As the items consisted of descriptive statements, the authors reviewed items in the literature extensively, relating them to the context in their own countries. This process resulted in the initial dimensions proposed: the status of PE, PE curricula in schools, PE teachers and their qualifications, the infrastructure needed to conduct PE, teaching PE, the benefits of PE, and current challenges to PE. The following items from the literature reviews were then generated to assess each content domain: *skill development and bodily awareness (SDBA), facilities and norms in PE (FNPE), quality teaching of PE* (QTPE), *plans to make PE feasible and accessible (PFAPE), social norms and cultural practices (SNCP), governmental input for PE (GIPE), cognitive-skills development (CSD)*, and *habituated behaviour in physical activities (HBPA)*. The authors identified 105 items related to professional perceptions of QPE; these were assessed for clarity and readability. Overall, 105 items were agreed upon; items recommended by the authors represented the content validity. As a secondary process, six volunteer students (familiar with the concept of QPE in school settings) were invited to determine whether the items generated by the authors in each factor were sufficiently clear and relevant. The students assessed whether the items described professional perceptions of QPES, whether important aspects or domains had been omitted, and whether any statements should be excluded from the existing items. The six students included one PhD student, two final-year Master's students, two sophomores, and one freshman. Three of the students studied PE, while the remaining three were from the social-science field. Based on their recommendations, four statements were revised. Ultimately, 65 items were finalised (song & Chen, 2012).

5.2.3. Judgement stage
The judgement stage focused on item validity and domain validity. Three external experts (PE professors) from other universities and the six previously mentioned student participants were invited to join this process. The three professionals were invited to determine the face validity and indicate whether the questionnaire provided an appropriate description of the study purpose and content area. The team also evaluated the feasibility, readability, consistency of style, formatting, clarity of language, and domain validity of the questionnaire. The use of these procedures was introduced by Haladyna (1999), Trochim (2001), and DeVon et al. (2007). A quantitative sorting process was carried out to determine whether the statements fit the instrument in the assessment of professional perceptions of QPES, and whether the statements were consistent with the eight corresponding dimensions. The participants were asked whether statements should be included using a 3-point scale (1 = *No*, 2 = *Maybe*, and 3 = *Yes*), and how confident they were that items should be included (i.e., *1 = Not sure*, 2 = *Sure*, and 3 = *Very Sure*). A minimum of two out of three experts agreed that each statement belonged to the instrument (where 3 = *yes*), and the mean confidence score was greater than 2.0 (where 2 > *sure*). The experts were asked to associate each of the 65 items with one of the 8 dimensions, indicating how confident they were that their selection related to the specific content domain. The rating scales and criteria for domain validity were the same as the item-validity criteria. During this process, two items were revised and one item was moved to a different content domain. In the end, 65 items were retained in the

instrument, classified into 8 original dimensions. The six student volunteers were invited to verify the items and domain validity, based on the experts' classifications. The same procedures and regulations were adopted, and no modifications were required.

5.2.4. Response format

The QPE questionnaire comprised two sections. The first section consisted of 65 items on QPE. Participants were asked how strongly they agreed with each statement on QPESs in their respective countries. They responded using a 6-point, positively packed agreement-rating scale. This scale included three negative and three positive agreement responses with identical scores (i.e., strongly disagree = 1, mostly disagree = 2, slightly disagree = 3, moderately agree = 4, mostly agree = 5, and strongly agree = 6). The use of positively packed rating scales are known to generate discrimination in the context of social desirability (Brown, 2004; DeVellis, 2003; Lam & Klockars, 1982; Song & Chen, 2012).

In addition, a confirmatory factor analysis (CFA) was carried out using AMOS 21.00 (IBM) to examine the retained eight-factor (48 items) structure from the exploratory factor analysis. The overall model fit was evaluated using multiple goodness-of-fit indexes, including a chi-square value, comparative fit index (CFI), Bentler-Bonett normed fit index (NFI), *parsimony comparative fit index* (PCFI), and the root mean square error of approximation (RMSEA), which was accompanied by a 90% confidence interval (90% CI). Although much debate surrounds the selection of precise thresholds of fit, especially within the field of theory-based multi-item/factor CFA testing (Markland, 2007; Marsh et al., 2004), it is commonly accepted that thresholds of >.90, close to (or less than) .08 (Bentler, 1995), and up to .08 (Bollen, 1989; Browne & Cudeck, 1993) for the CFI and RMSEA indicate an acceptable model fit. In addition, test-retest reliability was checked using an independent data sample.

5.3. Data analysis

Both statistical and empirical techniques were used to select the items. The 65 items were subjected to descriptive and frequency analyses. Using SPSS 20, the research team examined data quality in terms of frequency distribution and item discrimination. An exploratory factor analysis (EFA) with maximum likelihood extraction and direct oblimin rotation was used to investigate the structure of quality PE, and to define a set of factors accounting for the common variance among the items. These items were subsequently evaluated by their loading on each factor. The second phase of the analysis confirmed the different subscales and structures of the 65 items. A reliability analysis (Cronbach's alpha) was performed to determine the contribution of each item to its respective factor. When items were deemed to be statistically equivalent, the authors were asked to determine which items to retain and place under the appropriate categories to reflect their close conceptual meaning.
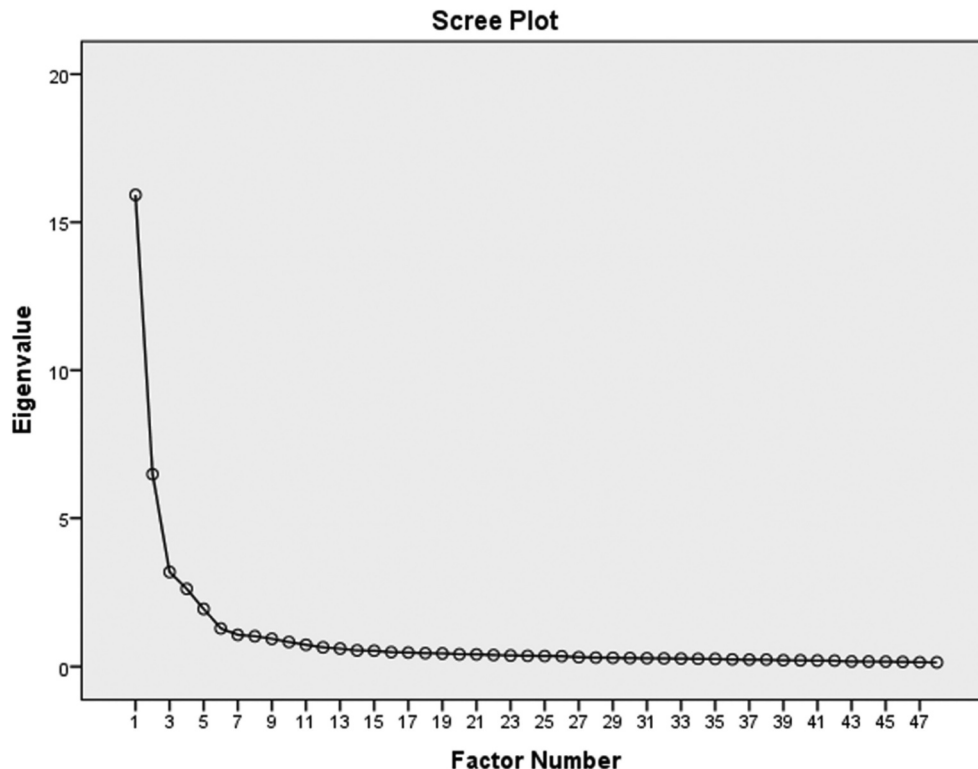
6. Results

6.1. Preliminary Analysis

The present study set out to identify a potential framework for investigating QPE, and to subsequently determine a structure for analysis. To achieve the primary purpose of the study, defining a set of factors to account for QPE, we present the results of the maximum likelihood extraction with a direct oblimin rotation. To determine the number of factors, several criteria, including differences between adjacent eigenvalues, a scree plot, and differences in the percentage of variance, were used (Figure 1). The goal was to account for adjacent factors and, more importantly, to consider the factor structure.

The presented solution presents the following eight factors (subscales): *SDBA, FNPE, QTPE, PFAPE, SNCP, GIPE, CSD,* and *HBPA*. These factors had eigenvalues of 15.921, 6.485, 3.187, 2.623, 1.941, 1.287, 1.072, and 1.025, respectively, with 64.14% variance.

Figure 1. Scree plot for factor analysis.

The results suggest that Asian professionals have a different perception of the development of supportive elements for QPES, core values (such as safety and accessibility), and curriculum arrangement. The internal consistency (Cronbach's alpha coefficient) of the eight subscales was calculated. Based on the item statistics, 8 items from *SDBA*, 13 from *FNPE*, 6 from *QTPE*, 2 from *PFAPE*, 3 from *SNC*, 5 from *GIPE*, 5 from *CSD*, and *6* from *HBPA* were selected and retained because of their excellent internal consistencies (Table 4). Of the 65 items, 17 items with low factor loadings were excluded from the analysis. Thus, the original set of 65 items was reduced to 48 items, which are listed in Table 4 for reference.

7. Underlying structure of professional perception of quality PE
The results of the factor analysis indicated that the 48 items listed in the final version of the questionnaire demonstrated sound and good inter-correlation results, as evidenced by the high value (.949) of the Kaiser-Meyer-Olkin measure of sampling adequacy (MSA) and a significant Bartlett's test of sphericity. The MSA comprised an index used to quantify the degree of inter-correlation among the items, and the appropriateness of the factor analysis. A measure that calculated a value greater than .50 for the entire matrix or an individual variable would indicate the appropriateness of acceptance (Field, 2000). The results of the factor analysis are presented in Tables 3 and 4. As indicated in Table 3, all items with factor loadings greater than .50 were retained. When the pattern matrix was considered (factor and structure matrices were considered because of cross-loading), three subscales were determined to retain and reflect the conceptual framework.

8. Internal consistency of the professional perception of quality PE
The internal-consistency reliability coefficients (Cronbach's alpha) for each subscale were computed. As shown in Table 4, the Cronbach's alpha coefficients for all eight factors were as follows: *SDBA* (.935), *FNPE* (.932), *QTPE* (.923), *PFAPE* (.884), *SNCP* (.825), *GIPE* (.859), *CSD* (.920), and *HBPA* (.933), indicating that the items were consistent within each factor and that

Table 3. Factor loadings based on a pattern matrix and communalities (h2) of the 48 items retained following an EFA

Sl No	Items description	Loading	M	SD	h
FACTOR 1: Skill Development and Bodily Awareness (SDBA)					
Item 51	Enhance their physical skills.	.806	4.66	1.10	0.70
Item 55	Enhance students' knowledge of sport related terms.	.796	4.42	1.19	0.70
Item 54	Provide students with chances to take part in different physical activities.	.782	4.58	1.16	0.72
Item 53	Enhance students' knowledge in different activities.	.715	4.48	1.17	0.70
Item 58	Give students chances to learn and interact with classmates	.668	4.66	1.12	0.54
Item 57	Teach students how important activity is to the process of growth.	.596	4.54	1.16	0.63
Item 50	Help students to understand how their bodies work.	.578	4.38	1.14	0.63
Item 45	Help students to develop a habit in attending sport activities after school and to use their spare time in sport wisely.	.538	4.47	1.20	0.64
FACTOR 2: Facilities and Norms in Physical Education (FNPE)					
Item 6	School should have safe and suitable environment for physical education lesson.	.806	5.59	0.87	0.64
Item 4	School should have safe and suitable equipment for physical education lesson.	.802	5.67	0.77	0.62

(Continued)

Table 3. (Continued)

Sl No	Items description	Loading	M	SD	h
Item 5	School should have safe and suitable facilities for physical education lesson.	.786	5.68	0.75	0.59
Item 12	Students should be given opportunities for active learning in physical education lesson.	.780	5.46	0.87	0.63
Item 10	Positive sport related attitudes and values should form a major focus in learning.	.752	5.37	0.91	0.61
Item 9	Health knowledge should be regarded as one of the major areas of learning.	.738	5.41	0.90	0.56
Item 8	Different types of physical activities and associated knowledge should form the content through which young people learn.	.715	5.26	1.02	0.56
Item 11	The teaching and learning of physical education should be fun and enjoyable.	.712	5.4	0.97	0.50
Item 3	Physical education should be a compulsory subject in school for all children.	.700	5.56	0.90	0.51
Item 13	Extension physical activity opportunities after-school or extra-curricular/co-curricular activities are essential components in helping students to extend their learning experiences in sport and physical activities.	.677	5.26	0.98	0.49

(Continued)

Table 3. (Continued)

Sl No	Items description	Loading	M	SD	h
Item 7	Teacher should be qualified to teach physical education.	.675	5.4	1.00	0.48
Item 2	Physical education should be accessible to all children, whatever their ability/ disability, sex, age, cultural, race/ethnicity, religious, social or economic background.	.667	5.49	0.87	0.46
Item 1	Physical Education is the most effective means of equipping children with the skills, attitudes, values, knowledge and understanding for lifelong participation in physical activity and sport.	.544	5.22	1.06	0.34
FACTOR 3: Quality Teaching of Physical Education (QTPE)					
Item 26	Learn and develop basic skills of different physical and sport activities.	-.680	4.68	1.15	0.67
Item 24	Demonstrate the basic understanding of the importance of physical activities and health.	-.674	4.42	1.26	0.68
Item 25	Communicate ideas, feelings effectively with others.	-.671	4.34	1.21	0.65
Item 22	Basic motor skills within the context of appropriate physical activities of low organization.	-.662	4.39	1.25	0.66

(Continued)

Table 3. (Continued)

Sl No	Items description	Loading	M	SD	*h*
Item 28	Demonstrate basic skills in decision making, communication, etc.	-.631	4.37	1.21	0.71
Item 27	At middle class level, developing appropriate health and fitness understanding that includes setting and achieving personal goals for healthy living.	-.631	4.53	1.17	.720
FACTOR 4: Plans for Feasibility and Accessibility of Physical Education (*PFAPE*)					
Item 60	There are frequent international collaborative plans between institutes in preparing QPES.	.899	3.64	1.41	0.89
Item 59	There are frequent inter-states collaborative plans between institutes in preparing QPES.	.728	3.8	1.39	0.72
FACTOR 5: Social Norms and Cultural Practice (*SNCP*)					
Item 64	Religious culture is an issue in contributing the development of unequal learning opportunity in our country.	.860	3.12	1.65	0.76
Item 63	Gender is an issue in contributing the development of unequal learning opportunities in our country.	.808	3.47	1.58	0.64

(Continued)

Table 3. (Continued)

Sl No	Items description	Loading	M	SD	*h*
Item 65	Economy is an issue in contributing the development of unequal learning opportunity in our country.	.669	3.61	1.68	0.51
FACTOR 6: Governmental Input for Physical Education (GIPE)					
Item 19	Support research to improve the effectiveness and quality of physical education.	.850	4.15	1.32	0.72
Item 21	Recognize the distinctive role of PE as part of a balanced education system for the realization of human potential, healthy, health and well-being of all citizens.	.795	4.23	1.29	0.68
Item 20	Work with international financial institutions to ensure physical education is included as part of their aid programmes in education.	.740	3.82	1.43	0.66
Item 17	Recognize that good quality physical education depends on well-qualified educators and thus priority is provided for training of qualified personnel even when other resources are in short of supply.	.678	4.28	1.3	0.49
Item 14	Implement policies for physical education as human right issue for all children.	.523	4.2	1.33	0.38
FACTOR 7: Cognitive Skill Development (CSD)					

(Continued)

Table 3. (Continued)

Sl No	Items description	Loading	M	SD	h
Item 39	Help students to develop their critical thinking skills.	−.804	4.19	1.25	0.77
Item 40	Enhance students' ability in problem solving.	−.756	4.29	1.21	0.75
Item 42	Raise students' innovative thinking.	−.689	4.17	1.27	0.75
Item 44	Raise students' independent thoughts.	−.580	4.36	1.17	0.64
Item 38	Help students to develop socially acceptable moral thinking and conduct.	−.561	4.48	1.16	0.65
FACTOR 8: Habituated Behaviour in Physical Activities (HBPA)					
Item 35	Demonstrate suitable decisions on actions for maintaining healthy living.	−.740	4.53	1.19	0.80
Item 34	Demonstrate a habit of regular exercises.	−.709	4.54	1.23	0.79
Item 36	Understand the relationship between physical and sport activities and personal and social development.	−.612	4.49	1.2	0.73
Item 37	Take up suitable responsibilities to serve sports clubs or other related activities in school or community.	−.595	4.41	1.24	0.65
Item 33	Develop advanced proficiency in different physical and sport activities.	−.511	4.59	1.18	0.65

(Continued)

Table 3. (Continued)

Sl No	Items description	Loading	M	SD	*h*
Item 32	Develop necessary skills of participation in and out-of-school programmes available within the community and which have potential for life long involvement and participation	−.507	4.52	1.20	0.60

Extraction Method: Maximum Likelihood.

Rotation Method: Oblimin with Kaiser Normalization.

a Rotation converged in 17 iterations.

cogent • education

Table 4. Inter-factor correlation, Cronbach's alpha and descriptive statistics for QPE

Factor	1	2	3	4	5	6	7	8	Alpha α	Mean ± SD	No of Items
1- SDBA	1.000	.248*	-.393	.375*	.053	.386*	-.671*	-.403*	.935	36.23 ± 7.70	8
2- FNPE		1.000	-.160*	.102*	-.063	.151*	-.159*	-.174*	.932	70.83 ± 8.89	13
3- QTPE			1.000	-.146	-.026	-.343*	.318*	.541*	.923	26.75 ± 6.18	6
4- PFAPE				1.000	.164*	.452*	-.419*	-.274*	.884	7.44 ± 2.65	2
5- SNCP					1.000	.187*	-.145*	-.045	.825	10.21 ± 4.23	3
6- GIPE						1.000	-.420*	-.262*	.859	20.70 ± 5.35	5
7- CSD							1.000	.416*	.920	21.51 ± 5.29	5
8- HBPA								1.000	.933	27.10 ± 6.29	6
											48

Extraction Method: Maximum Likelihood.
Rotation Method: Oblimin with Kaiser Normalization.

Note: 1- Skill Development and Bodily Awareness (*SDBA*), 2- Facilities and Norms in Physical Education (*FNPE*), 3- Quality Teaching of Physical Education (*QTPE*), 4- Plans for Feasibility and Accessibility of Physical Education (*PFAPE*), 5- Social Norms and Cultural Practice (*SNCP*), 6- Governmental Input for Physical Education (*GIPE*), 7- Cognitive Skill Development (*CSD*), 8—Habituated Behaviour in Physical Activities (*HBPA*).

Table 5. Gender-based descriptive and professional status information of participants						
Country	**Gender**		**Status**			**Total**
	Male	**Female**	**Master Final Students**	**School Teacher**	**University Teachers**	
India	174	208	82	89	211	382
Macau	122	73	98	54	43	195
Total	296	281	180	143	254	577

Table 6. Model fit indexes for the data collected using QPES	
Model$_H$	
N	577
$\chi 2$	3128.297
CMIN	3128.297
df	1052
CMIN/DF	2.974
CFI	.903
NFI	.861
TLI	.896
PCFI	.842
RMSEA	.058

Legend: Model H = the hypothesized model. N = sample size. CMIN = minimum discrepancy. DF = degrees of freedom. CFI = comparative fit index. NFI = normed fit index. RMSEA = root mean square error of approximation.

factors were consistent within the model, permitting further meaningful analysis. The inter-correlations between the four major practices were moderate, ranging from −.026 to .541, with an average of −.025. This indicated that the concepts were relatively independent of each other.

The factors *QTPE* and *CSD* were strongly correlated with *HBPA*. *SDBA* also showed a strong correlation with *PFAPE* and *CSD*. Further, a strong but negative correlation was reported with the factors *SBA, QTPE, CSD*, and *HBPA*. *PFAPE* and *CSD* showed a strong negative correlation, as did *QTPE* and *GIPE*, while the remaining factors were moderately correlated.

Descriptive results for the mean factor scores were calculated. In general, professionals reported the most positive attitudes toward *FNPE* (M = 70.83; SD = 8.89), followed by *SDBA* (M = 36.23; SD = 7.70), *HBPA* (M = 27.10; SD = 6.29), *QTPE* (M = 26.75; SD = 6.18), *CSD* (M = 21.51; SD = 6.29), and *GIPE* (M = 20.70; SD = 5.35). The lowest mean was identified for *PFAPE* (M = 7.44; SD = 2.65) and *SNCP* (M = 10.21; SD = 4.23). The Cronbach's alpha coefficient **(α = .940)** indicated excellent internal consistency for the overall measure.

A separate dataset was used for the CFA (measurement model). To check the retained factors' item loading, a measurement model was evaluated using multiple goodness-of-fit indexes, including chi-square value, CFI, NFI, PCFI, and RMSEA, accompanied by a 90% confidence interval (90% CI). The results of the robust CFA, using the maximum-likelihood estimation method, suggest that the eight-factor model provided an adequate fit to the data. For the current study, data were collected from a developing country (India) and a developed country (Macau SAR); demographic information is provided below (Table 5 and 6).

Table 7. Test-retest correlation of the samples from India and Macau					
Factors	**Extracted Sub-factors**	**Test-Retest Reliability (India)**		**Test-Retest Reliability (Macau)**	
No.		**Reliability**	**Mean ± SD**	**Reliability**	**Mean ± SD**
Factor 1	Skill Development and Bodily Awareness *(SDBA)*	α = .807	89.49 ± 4.09	α = .864	88.66 ± 5.01
Factor 2	Facilities and Norms in Physical Education *(FNPE)*	α = .818	130.45 ± 11.41	α = .851	123.05 ± 13.14
Factor 3	Quality Teaching of Physical Education *(QTPE)*	α = .806	60.67 ± 6.55	α = .865	60.02 ± 6.49
Factor 4	Plans for Feasibility and Accessibility of Physical Education *(PFAPE)*	α = .808	18.41 ± 3.21	α = .786	18.83 ± 2.85
Factor 5	Social Norms and Cultural Practice *(SNCP)*	α = .796	30.28 ± 4.10	α = .837	31.02 ± 3.26
Factor 6	Governmental Input for Physical Education *(GIPE)*	α = .900	49.52 ± 7.67	α = .846	52.41 ± 6.27
Factor 7	Cognitive Skill Development *(CSD)*	α = .812	47.00 ± 6.49	α = .799	49.97 ± 4.39
Factor 8	Habituated Behaviour in Physical Activities *(HBPA)*	α = .832	58.05 ± 7.61	α = .932	60.25 ± 6.79

9. Test-retest reliability

Test-retest reliability was conducted to examine stability over time; alpha coefficients were used to examine internal consistency (Table 7). As data for this study were gathered from developing and developed countries, test-retest reliability was conducted for data from locations in India and the city of Macau. Separate samples from India (n = 53) and Macau (n = 36) were used to demonstrate that the motives for participation measured by the QPES were stable over a fairly long period of four weeks. It is noteworthy that test-retest reliability over a four-week period was satisfactory, given that the participants (all residents of India and Macau) completed the questionnaires in English. English was not the first language of most participants. This suggests not only that the QPES is robust, but also that it is clear and comprehensible enough for its results to be generalised to other continents and non-native-English-speaking countries. The robustness found in the eight sub-scales of the QPES also showed high test-retest correlations (India, rs = .796 to .900 and Macau, rs = .799 to .932), supporting the stability of the components of the measure over time. Thus, the effect sizes of the QPES correlations reflected large effects.

10. Discussion

The overarching aim of this study was to develop an instrument to identify how professionals from various Asian countries perceived QPE. The findings indicate a model of professionals' perception of QPE, conceptually and empirically developed using eight subscales. Of the 65 items, 48 were retained, and 17 were excluded because of low factor loadings. The findings indicate that the professionals' perceptions centred strongly on the eight abovementioned factors.

The *SDBA* subscale in the model indicated that PE curricula could greatly enhance self-awareness, with individuals becoming more aware of their own bodies, the shapes they could make, the transfer of body weight, and their location in relation to other people and objects. They also emphasised skill development. Children can improve their body and spatial awareness with peers in a school environment (Hollett et al., 2016). This subscale consists of eight items with a mean score and SD of 36.23 ± 7.70 and high reliability (α = .935). With regard to the status of QPE, this finding is supported by Chaddock-Heyman et al. (2013), who argued that motor-skill development was pivotal to enhancing children's self-awareness and awareness of the outside world. As psychomotor skills are purely based on the progressive acquisition of mental and motor skills, this skill promotes the successful cultivation of an active lifestyle, which improves physical, cognitive, and mental health.

The second concern relates to the *FNPE* subscale. The core *FNPE* subscale also had good reliability (.932). This subscale consisted of 13 items, indicating the perspective of a structured PE curriculum, the safety and suitability of equipment, facilities and environment, and basic norms for the development of quality PE programmes in schools. In 2015, UNESCO's International Charter of PE and Sport (Article 5) recommended that adequate and safe spaces, facilities, equipment, and dress options be provided and maintained to meet the needs of PE participants, physical activity, and sport, while being mindful of different needs associated with climate, culture, gender, age, and disability. Recreational activities, environment building, opportunities for activity, a well-arranged sport curriculum, content knowledge, instruction, and assessment were identified as the major components of QPE (National Association for PE and Sport [NASPE], 2004).

However, infrastructure quality was not a primary development concern. According to Drewett and O'Leary (2006), fewer than half the schools they studied had adequate equipment for the revised PE curriculum. The Irish National Teachers' Organization presented the results of a survey at the 2007 Conference on Education, revealing that school PE equipment and resources were inadequate (Irish National Teachers' Organization, 2007). These reports indicate that the adequacy (quality and quantity) of equipment is closely related to a region's socioeconomic circumstances. However, researchers found poor facilities in oil-rich Kuwait (Hardman, 2008); Marshall and Hardman (2000) found insufficient indoor PE facilities in that country. De Vries (2003) identified different constraints in schools in Asia, including problems with PE curricular arrangements; overcrowded classes, with 40 or more students in each class; and PE and sport classes conducted in unused indoor and outdoor areas, rather than spaces specifically designed for and allocated to PE.

All statements indicated in the factor *QTPE* exhibited a mean ± SD of 26.75 ± 6.18. The factor earned a reliability score of α = .923, as calculated using Cronbach's alpha; this factor included items related to safe and suitable facilities, equipment, the environment for PE lessons, and qualified PE teachers. The factor *QTPE* is best defined as well-developed, high-quality teaching pedagogical features/indicators, used to identify increasing accountability and expectations. It enables teachers to understand and demonstrate high-quality PE teaching, and suggests ways to inform the provision of high-quality teaching across the curriculum (Light et al., 2014). This subscale is associated with the ability to learn and develop basic skills, understanding different physical and sports activities, health, and motor skills. Importantly, it also includes items that involve the demonstration of basic skills in decision making, communication, and communicating ideas and feelings effectively to others. In connection to this finding, Light et al. (2014) have lucidly

described how the pedagogical features of Game Sense provide quality teaching and learning to make the provision of high-quality teaching practical across the curriculum. Indeed, the ultimate outcome of quality teaching is the cultivation of a deep understanding. It encourages students to ponder teachers' questioning dialectically, and respond using assimilated knowledge in a concerted way within games (McNeill et al., 2008). The high expectations of teachers, and the opportunity to build a socio-moral environment in a game-setting context are prioritised to sustain students' motivation to learn, speak, and test their ideas.

The *PFAPE* had a mean score and SD of 7.44 ± 2.65 and high reliability (α = .884). This factor is best defined as regular international and inter-state collaborative plans that institutes need to prepare QPE. The current finding is well corroborated by a communiqué, announced by the Commonwealth Secretariat via recommendations for the Post-2015 Education Development Framework (2012), which stated that prevalent disadvantages and discrimination, based on socio-economic status, gender, geography, ethnicity, sexual identity, and special needs, could be resolved by an inclusive and overarching strategy in the education system. Ensuring adequate resources to achieve these "quality with equity" objectives will require international collaboration to mobilise resources for low-income countries and disadvantaged communities within countries. The EUPEA (2011) has argued that international collaboration between PE professionals is essential to the development of QPE, and should be promoted through exchange programmes for PE professionals.

The *SNCP* factor in the model prioritised concerns about religion, culture, gender discrimination, and socio-economic status—issues that lead to unequal learning opportunities in various countries. A structured PE curriculum, safe and suitable equipment and facilities, and a positive environment are prerequisites for the development of quality PE lessons. The professionals expressed the view that the principle of free PE should be upheld for all children, irrespective of their ability/disability, sex, age, culture, and ethnicity—or their religious, social, or economic background. The professionals believed that PE should be a compulsory school subject for all children, and that teachers should be qualified to teach PE. The *social norms and cultural practice* subscale had a mean score and SD of 10.21 ± 4.23, and high reliability (α = .825).

The *GIPE* mainly addresses government initiatives, which can build excellent PE programmes in particular states by supporting research to improve the quality of PE programmes, implementing policies that treat PE as a human-rights issue for all children, raising public awareness of the substantial benefits of PE, appointing well-qualified PE educators, and working with international financial institutions to ensure that PE is included in educational aid programmes. The GIPE subscale had a mean score and SD of 20.70 ± 5.35 and high reliability (α = .859). The role of governments in propagating PE programmes is immensely significant, enforcing legal requirements with respect to PE programmes in school curricula, while making it a compulsory subject (Doll-Tepper & Scoretz, 2001). Governments must ensure that healthy programmes exist and operate without discrimination. For example, Botswana lacks special PE lessons for students with disabilities in school. Certain parochial beliefs and superstitious attitudes prevent physically challenged people from taking part in games, sports, and other physical activities, for fear of being injured or mocked by able-bodied people. The rate at which teenagers drop out of sports has increased; in some places, female participation in sports has drastically decreased. Fewer older people and members of ethnic minority groups participate in sports. The government must therefore play a significant mediating role by curbing increasing obesity rates and bringing balance to the entire system. As productive teachers are the key to maintaining quality in the PE system, educating and recruiting quality teachers is at the forefront of the Government Education Policy (Marshall & Hardman, 2000). In a study conducted with 73 principals from New South Wales, Australia, Lynch and Soukup (2017) investigated how the implementation of quality PE in primary schools was perceived. The results indicated that the main barrier to QPE in primary schools was the inability to recruit qualified or well-trained teachers.

The *CSD* subscale had a mean score and SD of 21.51 ± 5.29 and high reliability (α = .920). This factor included items such as helping students develop their critical thinking skills, problem solving, innovative thinking, and independent thought to enhance socially acceptable moral thinking and conduct. Several studies have reported that organised physical-activity classes can significantly enhance students' cognitive skills. For example, Reed et al. (2010) identified a positive correlation between physical activity and fluid intelligence, which signifies the ability to reason quickly and abstractly. Children who performed moderate-to-vigorous physical activity during PE programmes performed better than their less active peers on the most demanding tasks, which required executive functions and academic performance (Castelli et al., 2007). These improvements included better scores on a mathematics test (Davis et al., 2011) and improved response accuracy in a memory test (Kamijo et al., 2011).

The *HBPA* factor shows that suitable decisions on actions to maintain the habit of healthy living through regular exercise help people understand the relationship between physical and sports activities, and personal and social development. This factor also includes responsibility for participating in school or community sports clubs and related activities to build the skills needed to gain advanced proficiency in various physical and sports activities within and outside school programmes available within the community. These can encourage lifelong involvement and participation. Research by Kremers et al. (2008) shows that strengthening the habitual nature of physical activity among children can help them establish higher levels of physical activity, which precedes a healthy lifestyle. For the promotion of physical activity among children to be successful, however, education must first raise their levels of awareness. This may explain why the *HBPA* subscale had a mean score and SD of 27.10 ± 6.29, and a high reliability (α = .933) score. It is also understood, based on research by Aarts et al. (1997), that instilling good habits in children predicts healthy living because behaviour performed repeatedly may be automatically triggered by environmental cues, and thus, become habitual (Kremers et al., 2008).

11. Conclusion

The QPE assessment tool developed in this study can be used as an instrument to understand professionals' perceptions of the concept of quality development in PE in Asia. In addition, it can determine the status of PE quality development in their countries, and monitor the overall development of the field. The present study presents the properties associated with the validity and reliability of a scale designed to measure professionals' perceptions of PE quality. The study further identifies factors that professionals consider important to the provision of quality PE learning in schools. This study can be used as the basis especially in Asia for recommending actions to institutions, governments, and concerned authorities. The assessment tool can be used for research and applied work carried out to learn about PE. The Cronbach's alpha coefficients indicate excellent internal consistency for the overall measure, as well as the retained sub-factors, including the CFA and test-retest reliability. The QPE assessment instrument has a good fit with the data using the CFA approach in the eight-factor model. Items with low factor loadings can help researchers learn why particular items are not identified as important in the QPE study. This knowledge may help to clarify and explain progress in QPE development.

12. Recommendations

This research aims to measure professionals' perceptions of quality PE (QPE). To the best of our knowledge, few studies have been conducted along the same lines. For this reason, future studies are strongly advised to apply the extracted items to country-wise research, using an independent sample. Future studies could also conduct class-wide research (on primary-school, middle-school, high-school, and university-level teachers) to analyse issues in-depth at each level of education. Nevertheless, the research team aware of the limitation in having 48 items as instrument for global study in QPE unless there is the works to analysis the data from other continents. The

research team expects to conduct this examination as quick as possible in order to develop a reliable tool for future measuring QPE in different regions.

Author details
Walter King Yan Ho[1]
E-mail: walterho@um.edu.mo
Md. Dilsad Ahmed[2]
E-mail: walterho@um.edu.mo
Klaudia Kukurova[1]
E-mail: klaudiakukurova@um.edu.mo
ORCID ID: http://orcid.org/0000-0003-0666-1267
[1] Faculty of Education, University of Macau, Taipa, Macau, China.
[2] School of Biological and Population Health Sciences, College of Public Health and Human Sciences, Oregon State University, Oregon, USA.

References
Aarts, H., Paulussen, T., & Schaalma, H. (1997). Physical exercise habit: On the conceptualization and formation of habitual health behaviours. *Health Education Research*, 12(3), 363–374. https://doi.org/10.1093/her/12.3.363
Arar, K. H., & Rigbi, A. (2009). To participate or not to participate? - Status and perception of PE among Muslim Arab-Israeli secondary school pupils. *Sport Education and Society*, 14(2), 183–202. https://doi.org/10.1080/13573320902809088
Bentler, P. M. (1995). *EQS structural equations program manual*. Multivariate Software, Inc.
Bollen, K. A. (1989). *Structural equations with latent variables*. Wiley.
Brown, G. T. L. (2004). Measuring attitude with positively packed self-report ratings: Comparison of agreement and frequency scales. *Psychological Reports*, 94(3), 1015–1024. https://doi.org/10.2466/pr0.94.3.1015-1024
Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Sage.
Castelli, D. M., Hillman, C. H., Buck, S. E., & Erwin, H. E. (2007). Physical fitness and academic achievement in 3rd and 5th grade students. *Journal of Sport & Exercise Psychology*, 29(2), 239–252. https://doi.org/10.1123/jsep.29.2.239
Centers for Disease Control [CDC]. (2010) . *Strategy to Improve the quality of Physical Education*. Centers for Disease Control: Department of Health & Human Services.

Chaddock-Heyman, L., Erickson, K. I., Voss, M., Knecht, A., Pontifex, M. B., Castelli, D., & Kramer, A. (2013). The effects of physical activity on functional MRI activation associated with cognitive control in children: A randomized controlled intervention. *Frontiers in Human Neuroscience*, 7(72), 1–12. https://doi.org/10.3389/fnhum.2013.00072
Confederation of Indian Industry (CII). (2017). White paper on establishing national curriculum Standards for sports education in India. CII. India. https://www.cii.in/ResourceDetails.aspx?enc=qOHehjHt+EcGl+HlZTF6bPtbJJl3ao6uO7U37Sz7d8m7dlu5ABzJG07AY8e083eSg+/ktru7PrqRbpuU/AcFGy4cK6rbJxZAalzyn0C8EpS+BbrZAtFyl+7CuHSL02rfuQGDtn4Pbj9V6ttXogQqIAOeM8Q/FI3VatfJkFdGwQ6ITXiUU5Zqdv3nbASY4UTN
Curriculum Development Council (CDC). (2000). *Learning to Learn- The Way Forward in Curriculum Development (Consultation Document)*. Curriculum Development Council.
Davis, C. L., Tomporowski, P. D., McDowell, J. E., Austin, B. P., Miller, P. H., Yanasak, N. E., & Naglieri, J. A. (2011). Exercise improves executive function and achievement and alters brain activation in overweight children: A randomized, controlled trial. *Health Psychology*, 30(1), 91–98. https://doi.org/10.1037/a0021766
De Vries, L. A. (2003). *The Study of the Concept of Context in PE in Asian School*s. In *Proceedings: the 4th ICHPER. SD Asia Congress, Bangkok Thailand*, (pp. 426–431). Bangkok: Thai Association for Health, PE and Recreation.
DeVellis, R. F. (2003). *Scale development: Theory and applications (2nd Edition)*. Sage Publications, Inc.
DeVon, H. A., Block, M. E., Moyle-Wright, P., Ernst, D. M., Hayden, S. J., Lazzara, D. J., Savoy, S. M., & Kostas-Polston, E. (2007). A psychometric toolbox for testing validity and reliability. *Journal of Nursing Scholarship*, 39(2), 155–164. https://doi.org/10.1111/j.1547-5069.2007.00161.x
Doll-Tepper, G., & Scoretz, D. (2001). *Proceedings from, "World Summit on PE"*. Verlag Karl Hofmann.
Drewett, J., & O'Leary, M. (2006). *Assessment in Irish primary school PE: A survey of attitudes and practice* [Unpublished paper]. St Patrick's College.
EUPEA. (2011). *Declaration of Madrid "No Education without PE"*. Brussels, EUPEA. (Accessed 20/ 11/2014).
Field, A. (2000). *Discovering statistics using SPSS for Windows*. SAGA.
Guan, J., McBride, R., & Xiang, P. (2005). Chinese teachers' attitudes toward teaching physical activity and fitness. *Asia-Pacific Journal of Teacher Education*, 33(2), 147–157. https://doi.org/10.1080/13598660500121928
Haladyna, T. (1999). *Developing and validating multiple-choice test items*. Lawrence Erlbaum.
Hardman, K. (2008). Physical Education in Schools: A Global Perspective. *Kinesiology*, 40(1), 5–28.
Hardman, K. (2009). A Review of the global situation of PE. *International Journal of PE*, 46(3), 106–116.
Ho, W. (2007a). Sport globalization – The Asian experiences. *International Journal of Eastern Sports and Physical Education*, 5(1), 9–25.
Ho, W. (2007b). Physical education development in Macao – Is the society ready to adopt the change in physical education? *International Journal of Eastern Sports and Physical Education*, 5(1), 59–67.

Ho, W., Ahmed, D., Carvalho, P. G., Antala, B., Imre, M., Valeiro, M. G., Kougioumtzis, K., Cazzoli, S., Van Niekerk, R. L., Morris, T., Huang, F., & Wong, B. (2019a). Development of an instrument to assess perception of Quality Physical Education (QPE) among the European professionals. *South African Journal for Research in Sport, Physical Education and Recreation*, *41*(1), 31–49.

Ho, W., Ahmed, D., de D'Amico, R. L., Ramos, A., Ferreira, E. L., Ferreira, M. B. A., Amaral, S. C. F., Gurrola, O. C., Diaz, G. B., Ramos, A., Hoyos, L. A., Jasmin, A., Duque, A. R., Van Nielerk, R. L., Huang, F., & Wong, B. (2018). Measuring the perception of Quality Physical Education in Latin American professionals. *Revista Brasileira De Ciencias Do Esporte*, *40*(4), 361–369. https://doi.org/10.1016/j.rbce.2018.05.006

Ho, W., Ahmed, D., Khoo, S., Tan, C. H., Dehkordi, M. R., Gallardo, M., Lee, K. C., Yamaguchi, Y. S., Tao, Y. P., & Shu, C. N. (2019b). Towards developing and validating Quality Physical Education in schools – The Asian physical education professionals' voice. *Plos One*, *14*(8), E0218158. http://doi.org/10.1371/journal.pone.0218158

Ho, W. K. Y., Ahmed, D. M., Keh, C. N., Khoo, S., Tan, C., Dehkordi, R. M., Gallardo, M., Lee, K., Yamaguchi, Y., Wang, J., Liu, M., & Huang, F. (2017). Professionals' perception on Quality PE Learning in selected Asian cities. *Cogent Education*, *4*(1), 1408945. https://doi.org/10.1080/2331186X.2017.1408945

Hollett, N., Sluder, J. B., Taunton, S., & Howard-Shaughnessy, C. (2016). Teaching Body and Spatial Awareness in Elementary PE Using Integration of Core Content Subjects. *Journal of PE, Recreation & Dance*, *87*(7), 31–35. https://doi.org/10.1080/07303084.2016.1202800

Holzweg, M., Ho, W. K. Y., Antala, B., Benn, T., Dinold, M., de D'Amico, R., Saunders, J., & Bumm, K. (2013). Sharing global voice: Perception of PE and school sport worldwide. *International Journal of PE*, *L*(3), 29–39.

International Council of Sport Science and Physical Education [ICSSPE]. (2010). *International Position Statement on Physical Education*. ICSSPE, Berlin. https://www.icsspe.org/sites/default/files/International%20Position%20Statement%20on%20Physical%20Education.pdf

International Council of Sport Science and Physical Education [ICSSPE]. (2012). *International Benchmarks for Physical Education Systems*. ICSSPE, Berlin. https://www.icsspe.org/system/files/Final%20ICSP%20Benchmarks%20ICSSPE%20Dec%202012.pdf

Irish National Teachers' Organization. (2007). Physical Education in the Primary School. In *Proceedings of the Consultative Conference on Education, 2007 conference*, (pp. 27–28). Dublin.

Jin, A. (2013). PE curriculum reform in China: A perspective from PE teachers. *Physical Education & Sport Pedagogy*, *18*(1), 15–27. https://doi.org/10.1080/17408989.2011.623231

Jin, C. (2016). Analysis on factors of affecting the status of PE in Chinese school. In *SHS Web of Conferences (Vol. 24):02017-P.1-P.5*. EDP Sciences.

Kamijo, K., Pontifex, M. B., O'Leary, K. C., Scudder, M. R., Wu, C. T., Castelli, D. M., & Hillman, C. H. (2011). The effects of an afterschool physical activity program on working memory in preadolescent children. *Developmental Science*, *14*(5), 1046–1058. https://doi.org/10.1111/j.1467-7687.2011.01054.x

Keating, X. D., & Silverman, S. (2004). PE teacher attitudes toward fitness test scale: Development and validation. *Journal of Teaching in PE*, *23*, 143–161. https://doi.org/10.1123/jtpe.23.2.143

Kremers, S. P., Dijkman, M. A., de Meij, J. S., Jurg, M. E., & Brug, J. (2008). Awareness and habit: Important factors in physical activity in children. *Health Education*, *108*(6), 475–488. https://doi.org/10.1108/09654280810910881

Lam, T. C. M., & Klockars, A. J. (1982). Anchor point effects on the equivalence of questionnaire items. *Journal of Educational Measurement*, *19*, 317–322.

Light, R., Curry, C., & Mooney, A. (2014). Game sense as a model for delivering quality teaching in PE. *Asia-Pacific Journal of Health, Sport and PE*, *5*(1), 67–81. DOI:10.1080/18377122.2014.868291

Lorraine, P. S. (2013). Geographies of social exclusion: Education access in the Philippines. *Comparative Education*, *49*(3), 361–373. https://doi.org/10.1080/03050068.2013.803784

Lynch, T., & Soukup, G. J. (2017). Primary PE (PE): School leader perceptions about classroom teacher quality implementation. *Cogent Education*, *4*(1), 1348925. https://doi.org/10.1080/2331186X.2017.1348925

Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research*, *35*(6), 382–385. https://doi.org/10.1097/00006199-198611000-00017

Markland, D. (2007). The golden rule is that there are no golden rules: A commentary on Paul Barrett's recommendations for reporting model fit in structural equation modelling. *Personality and Individual Differences*, *42*(5), 851–858. https://doi.org/10.1016/j.paid.2006.09.023

Marsh, H. W., Hau, K. T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in over generalizing Hu and Bentler's (1999) findings. *Structural Equation Modeling*, *11*(3), 320–341. https://doi.org/10.1207/s15328007sem1103_2

Marshall, J., & Hardman, K. (2000). The state and status of PE in schools in international context. *European PE Review*, *6*(3), 203–229. DOI:10.1177/1356336X000063001

McNeill, M., Fry, J., Wright, S., Tan, C., & Rossi, T. (2008). Structuring time and questioning to achieve tactical awareness in games. *PE & Sport Pedagogy*, *13*(3), 231–249. https://doi.org/10.1080/17408980701345766

Meyrick, J. (2006). What is good qualitative research? A first step towards a comprehensive approach to judging rigour/quality. *Journal of Health Psychology*, *11*(5), 799–808. https://doi.org/10.1177/1359105306066643

National Association for PE and Sport [NASPE]. (2004). *Moving into the future: National standards for PE* (2nd Ed. ed.). Author.

Oxford Business Group. (2008). *Thailand aims to improve previous reforms to its education system*. OBG. https://oxfordbusinessgroup.com/analysis/refined-reform-new-change-education-aims-improve-previous-reforms

Poortinga, Y. H. (1989). Equivalence of cross-cultural data: An overview of basic issues. *International Journal of Psychology*, *24*(1), 737–756. https://doi.org/10.1080/00207598908246809

Reed, J. A., Einstein, G., Hahn, E., Hooker, S. P., Gross, V. P., & Kravitz, J. (2010). Examining the impact of integrating physical activity on fluid intelligence and academic performance in an elementary school setting: A preliminary investigation. *Journal of Physical Activity & Health*, *7*(3), 343–351. https://doi.org/10.1123/jpah.7.3.343

Ruscoe, G. C. (1969). *The Conditions for Success in Educational Planning*. UNESCO: International Institute for Educational Planning.

cogent • education

Song, L., & Chen, J. (2012). University students' conceptions of an excellent PE teacher in China. *European PE Review, 19*(1), 110–121. DOI:10.1177/1356336X12465512

Sport and Development 1st International Conference. (2003). *Magglingen Declaration and Recommendation on Sport and Physical Education*. UNSDP and Swiss Academy for Development.

Straub, D., Boudreau, M. C., & Gefen, D. (2004). Validation guidelines for IS positivist research. *Communications of the Association for Information Systems, 13*, 380–427. https://doi.org/10.17705/1CAIS.01324

Subramaniam, P. R., & Silverman, S. (2007). Middle school students' attitude toward PE. *Teaching and Teacher Education, 23*(5), 602–611. https://doi.org/10.1016/j.tate.2007.02.003

Trochim, W. M. K. (2001). *The Research Methods Knowledge Base*. Atomic Dog.

UNESCO. (1978). *International Charter of PE and Sport*. UNESCO

UNESCO. (2005). *UNESCO Seminar on Quality of Physical Education and Sport – Final Report*.

UNESCO. (2015). *Quality PE (QPE), Guidelines for Policy-Makers*. Published in 2015 by the United Nations Educational, Scientific and Cultural Organization.

Wang, Y., Yao, L., & Zang, J. (2009). Implementation of hidden curriculum in PE and its effect on students' attitude to exercise. *Journal of Beijing Sport University, 32*(4), 32–34.