

Perceived Benefits of Physical Education in University Students and Their Effects on Adjustment to University Life*

Junichi Nishida¹, Kimio Hashimoto², Atsushi Kiuchi³, Toshihiko Tsutsumi⁴,
Koji Yamamoto⁵ and Hideaki Tanimoto⁶

¹Faculty of Business Administration, Kindai University
3-4-1 Kowakae, Higashi-Osaka, Osaka 577-8502
E-mail: jnishida@bus.kindai.ac.jp

²Faculty of Social Welfare, Kumamoto Gakuen University
2-5-1 Ohoe, Chuo-ku, Kumamoto 862-8680

³Faculty of Health and Sport Sciences, University of Tsukuba
1-1-1 Tennodai, Tsukuba, Ibaraki 305-8574

⁴Department of Human Sciences, Osaka University of Human Sciences
1-12-13 Shouya Settu-shi, Osaka 566-0012

⁵Center for Fundamental Education, the University of Kitakyushu
4-2-1 Kitagata, Kokuraminami-ku, Kitakyushu, Fukuoka, 802-8577

⁶Department of Sport and Health Sciences, Osaka Sangyo University
3-1-1 Nakagaito, Daito, Osaka 574-8530

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Maladaptation to university life by undergraduates has often been reported in recent years. Therefore, improvements in the provision of support for student is urgently required. Previous studies have indicated that physical education (PE) classes might provide effective opportunities for improving students' adjustment to universities. The purposes of this study were to develop a scale for quantitatively evaluating perceived benefits of PE in university students and to verify its reliability and validity. Then, the effects of perceived benefits of PE on adjustment to university life were examined by using this scale. A questionnaire survey was conducted with university freshmen ($n = 2,412$) that were enrolled in four-year universities and were taking PE classes. The survey questions consisted of items for developing the assessment scale, and a school adjustment scale. The "Perceived Benefits Scale of university First-Year PE classes (PBS-FYPE)" through exploratory factor analysis. The scale consisted of following sub-scales: "Acquisition of motor skills and training methods," "Understanding the importance of cooperative play and improvement of communication skills," "Stress coping and arousal of positive feelings," "Improvements in physical fitness and physical activities," and "Establishment of regular lifestyles." Subsequent analyses confirmed the adequate internal consistency and criterion-related validity of the scale, as well as its reliability and validity. Next, the effects of perceived benefits of PE on adjustment university life were examined by multiple group structural equation modeling taking part in individual and group sporting events. Results indicated "the sense of comfort" was relatively well explained in both groups by the value of the explanatory variables. Moreover, higher scores for "Understanding the importance of cooperative play and improvement of communication skills" were associated with a higher scores for "the sense of comfort". This effect was stronger in group, compared to individual activities. Finally, limits of this study and future issues including the investigation of factors related to the scale and the necessity for longitudinal research are discussed.

Keywords: learning outcomes, first year students, the perceived benefits scale, validity, multiple group structural equation modeling

1. Introduction

Since World War II, the rate of advancement to university in Japan has continually risen, recently exceeding 50%, the highest level ever (MEXT, 2015a). Higher education in Japan is approaching the universal access model, increasing the popularization of universities. Along with this situation, many students who previously would not have been conventionally accepted to university have been welcomed, resulting in changes in student entrance conditions. According to a survey conducted in 2011, the student rate of leaves of absence has increased to 2.72%, while the dropout rate has increased to 1.32%. When the causes are examined over the years, the most common reasons are related to such negative factors as a poor academic performance and reduced motivation (Uchida, 2014). At the same time, university students frequently indicate lack of self-assertiveness and communication skills as a cause for inability to along well with others. Mental health disorders such as depression and social withdrawal are also frequently cited, sometimes resulting in leaves of absence, dropouts, or repeating the year (Ichimiya et al., 2003; Sakaguchi, 2009; Uchida, 2007; 2014). In addition, it has been noted that attention should be given to students who are on leave of absence, have dropped out, or are repeating the year due to increased risk of suicide.

Under these circumstances, improvement in one's sense of adjustment to, suitability, and place in the university is strongly needed to achieve a rich university life, and thus bolstering student support over a wide range of facets of student life is required. In particular, freshmen face a variety of issues: Academic life, interpersonal relationships, and student life (Japan Student Services Organization, 2007), and it has been shown that the sense of university adjustment decreases for both men and women after entering university (Okuma et al., 2013). Furthermore, the sense of university adjustment in students' first year has been shown to influence that same sense in their fourth year (Yoshino et al., 1986). In light of this, adjustment during the initial adjustment period from the beginning of the year is key, and proper support for first-year students' adjustment is also indispensable.

1.1. Physical education may positively affect adjustment to university life

To improve the sense of adjustment, not only limited support but also various effective longer-term supports are necessary. Participation in physical education in higher education is an important educational opportunity that encourages lifelong exercise based on an organizational viewpoint and at the same time reveals various benefits for university students of physical education classes. Hashimoto (2012), in an overview of previous studies, describes the effects on university students of physical education classes at universities in four areas: Physical effects such as physical fitness improvement and reduction of percentage of body fat; mental effects such as emotional changes and self-concept transformations; social effects such as improvements in life skills and the cultivation of human relationships; and further lifestyle improvement such as an increase in the number of steps walked per day and in daily life activities. In addition, Nara (2015) summarized the effects found in previous studies in the interpersonal social psychology, such as communication and social skills, and the effects on mental health, such as improved perception and self-efficacy, derived through university physical education classes. Furthermore, research results over diverse variables have verified the positive transformations and the wide range of positive effects that physical education classes may exert on university students.

It is possible that the numerous effects of physical education classes mentioned here are roughly similar to the factors influencing the perception of adjustment to school (Okubo, 2005), and that physical education may also have a positive influence on the sense of adjustment to university. That is, factors influencing the perceptions of adjustment towards school were reported to include relationship between friends, self-emotions, and physical fitness (Fukuoka, 2007; Honma et al., 2002; Honma et al., 2005; Minami et al., 2011; Nakamura and Matsuda, 2013; Okubo, 2005; Shimoda et al., 2014). These results are similar to those obtained from physical education classes (Bailey et al., 2009; Nishida et al., 2015). Thus, the effects of physical education classes may provide positive, effective support to adjusting to university life. In particular, improvement of the sense of adjustment through the first year's physical

education classes enables a smooth start of university life and has a notable positive influence on continued schooling (including preventing leaves of absence and dropping out) as well as social adjustment after graduation. Physical education thus has great significance. One report attributes a decreasing trend in the dropout rate to the change in physical education classes from an elective to a compulsory subject (Oura, 2012), and another states that physical education classes are suitable classes to encourage university students to adjust mentally and physically (Nakamura, 2007). Thus, educational practices have been started that prominently position subjects that both encourage academic and social adjustment of university freshman as well as physical education (Kiuchi, 2012). Nishida et al. (2009) also examined the influence of physical education classes on perceptions of university adjustment, showing that the sense of adjustment to university could be improved in intervention classes intended to support communication skills. Susaki and Sugiyama (2015) also studied influence of physical education classes on the sense of university adaptation, but this study was limited to applying a sense of adaptation scale created based on physical education classes of junior high school students. Though the research mentioned above indicates the possibility that physical education classes have a positive effect on perceptions of university adjustment, such research remains extremely limited. In particular, there appear to be no studies demonstrating a comprehensive examination of physical education instruction at university and how such classes affect the sense of university adjustment. It might be possible by examining what types of physical education classes influence university adjustment to elucidate some of the relevant factors of university adjustment and better understand the practice of physical education classes intended to improve university adjustment.

As mentioned above, a wide range of effects can be expected from physical education classes, but since the overall revision of standards for the establishment of universities (the so-called Deregulation of University Act), the setting of the minimum number of credits for health and physical education subjects has been abolished. Thus, each university offers physical education classes at its discretion, which allows a flexible curriculum and results in physical education classes with various forms and

contents. However, undergraduate departments that require physical education course attendance are declining, remaining at around 60% at private universities (Japanese Association of University Physical Education and Sports, 2014). Furthermore, among the 52 national universities, the number of universities conducting physical education classes as a compulsory subject university-wide amounts to 22, only about 40% of all such universities (Kyoto University, 2014). As a result, physical education classes have been shifting from compulsory to elective subjects in recent years, and the promotion of exercise and sports practice based on organizational points of view, the development of learning through compulsory education, and acquisition of diversified interests has grown difficult.

1.2. Necessity of clearly indicating the learning outcomes of physical education class

Now with rapid changes in society including globalization, the declining birthrate, and the consequent aging of the population in recent years, universities must train human resources able to prepare the next generation for an industrial world and to benefit their local community. The importance of efforts to qualitatively change the university undergraduate education so as to better promote proactive learning has been indicated (Central Education Council, 2012). Of particular importance is improving the quality of undergraduate education so as to provide abilities required to participate in adult society, to grasp the kind of learning specifically obtained, and to clarify university education outcomes. As mentioned above, although a large number of studies of the effects of physical education classes (hereinafter referred to as “learning outcome”) have been reported, most have hypothesized learning outcomes from the perspective of researchers, and the identification of individual effects has been based on such hypotheses. Such studies are thus often quite limited in describing the merits and learning outcomes of physical education classes. Conversely, other studies have been based on the viewpoints of the students and have explored the learning outcomes of physical education classes. Nishida et al. (2015) asked students who had taken such classes to look back on the experience and provide qualitative answers on the specific learning (benefits) associated with physical education classes.

Results of this study included 872 keywords derived by sorting the collected language data by occurrence frequency, with “ability,” “friends,” “enjoyment,” “exercise,” and “body” the top keywords. In addition, 10 qualitative categories of perceived benefits were obtained (“formation and expansion of friendship,” “increase in frequency of exercise,” “realization of enjoyment,” “increase in physical fitness,” “enhancement of communication skills,” “improvement of lifestyle,” “acquisition and improvement of exercise skills,” “understanding exercise methods and rules,” “understanding the importance of team play,” and “stress resolution”). The results of these studies were based on the experiences of teachers who had planned and implemented such courses based on the results of previous research and the educational experiences of other instructors (primarily researchers of physical education and sports science) in charge of physical education classes at universities. These results are invaluable, as they represent a significant part of the concrete results of the above studies. Despite the value of these studies in qualitative categories, however, quantitatively evaluating the subjective benefits to the participants of physical education classes remains difficult, as does examining the relationship between subjective benefits and other variables. Therefore, what is expected is an evaluation scale that quantitatively captures subjective benefits (Nishida et al., 2015). To date, Shimizu et al. (2012) have produced a unique Effective Cognition Scale for University Physical Education Classes. However, while this scale emphasizes factors related to stress response, it does not incorporate a factor measuring utility cognition. Furthermore, as this scale adopts a question format that abstractly inquires into the perceptions of the effectiveness of physical education classes in light of past experience, the Japanese version of the scale lacks accuracy and is difficult to use. In addition, as reference values for evaluation are not shown, the interpretation of measurement results is difficult. Thus, there are limits to existing evaluation scales for the learning outcomes of physical education classes at universities. There is thus room for future research.

In light of the above background, our current study investigated the possibility of quantitatively and generally evaluating the perceived benefits of first-year physical education classes through free description analysis (Nishida et al., 2015) of the

perceived benefits of physical education classes to university students so as to examine the structure of the evaluation scale and verify its reliability and validity. Furthermore, the purpose of this study was to examine the to which extent the perceived benefits of first-year physical education accrue to adjustment to university life in terms of their “perceived benefits,” as defined by Wilcox et al. (2006), so as to determine the extent to which students perceive the benefits to their own learning and awareness of physical education classes.

2. Methods

2.1. Participants

Participants were first-year students enrolled as undergraduates of four-year national public and private universities in the Kanto, Kansai, Chugoku, and Kyushu districts (1 national university, 2 public universities, and 3 private universities for a total of 6 universities), and first-year students who took physical education. Among these, students of advanced age and those who failed to complete the survey were excluded from analysis as invalid; when a few invalid responses were included in the survey, they were treated as missing values and included as effective respondents. Ultimately, 2,412 participants were treated as eligible persons (valid respondents). Among these, 97 participants were considered re-examination participants to examine the reliability of the evaluation scale. The investigation period extended from late July to early August 2014.

Furthermore, in order to examine the validity of the evaluation scale and features based on the class content (an athletic activity), a separate study was conducted of first-year students enrolled at two of the universities mentioned above who took physical education classes. Final results excluded those who provided inappropriate responses such as mistakes in answering methods or invalid responses from analysis, resulting in a total of 720 participants (valid respondents). This survey was conducted from late January to late February 2015.

2.2. Measures

2.2.1. Demographics

For demographic information, participants were asked their university department, sex, age, grade,

athletic activity, and course attendance.

2.2.2. Item generation: Perceived benefit evaluation scale items of the first-years' physical education classes

Based on the qualitative classification above of the perceived benefits of university physical education classes indicated by Nishida et al. (2015) and the relevant keywords (e.g., *physical fitness, talking, lifestyle, technique, method, team play, stress*), five researchers specializing in the psychology of physical education, sociology of physical education, and clinical psychology were consulted repeatedly and generated 30 items total, with three items for each qualitative category, a limit set to minimize the number of items while accurately expressing each qualitative category after a careful examination based on qualitative categories and keywords (Nishida et al., 2015). The questionnaire was intended to reduce the number of items as much as possible so as to permit evaluation to be carried out in a short time in a review after each physical education class. University physical education classes were accompanied by actual practice of practical athletic activities. In generating the scale items, we ensured that the semantic contents of each qualitative category did not overlap, that no questions contained terminology difficult for respondents to understand, and that response bias did not occur. Specifically, in order to avoid unevenness in responses, we were careful to use appropriate phrasing including adverbs and comparative expressions (e.g., "I was able to fully relieve stress," "I was able to increase physical fitness level than before"). Participants scored each item on a 7-point Likert-type scale: (1) *completely disagree*; (2) *strongly disagree*; (3) *somewhat disagree*; (4) *neither agree nor disagree*; (5) *somewhat agree*; (6) *strongly agree*; and (7) *completely agree*. When scoring these scale items, we requested that participants respond after reflecting on activities starting from their first class.

2.2.3. The Effective Cognition Scale for University Physical Education Classes (ECSUPEC)

A total of 12 items were used from the Effective Cognition Scale for University Physical Education Classes (ECSUPEC) developed by Shimizu et al. (2012), with four items in each of the sub-scales of diet effect, promotion of interpersonal relationships, and lifestyle improvement. This scale mea-

sures the perception of the utility of participating in university sports classes. Items were scored on a five-point Likert scale ranging from (1) *disagree strongly* to (5) *agree strongly*, such that the higher the score, the stronger the perception of the utility of each aspect. This scale has been confirmed to show sufficient reliability and validity (Shimizu et al., 2012). In addition, this scale was used to examine the validity of a novel scale to evaluate the perceived benefits of the first year of physical education classes. The above subscales are expected to correlate relatively strongly with the subscales created for physical fitness, communication, and lifestyle, respectively.

2.2.4. The Experience Scale in University Physical Education Classes (ESUPEC)

The Experience Scale in University Physical Education Classes (ESUPEC) developed by Shimamoto and Ishii (2007) was used. This scale was developed to evaluate sports experience in university physical education classes and consists of 14 items grouped into four sub-scales: Self-disclosure, cooperation, challenge, and enjoyment. Responses to questions on physical exercise classes experience range from (1) *none* to (4) *frequently*. The reliability (internal consistency) and validity (construct validity) of this scale have been confirmed (Shimamoto & Ishii, 2007). In addition, this scale was used to examine the validity of construct concepts of the scale to evaluate perceived benefits of the first-year physical education classes. The four subscales are expected to be correlated relatively strongly with the subscales of friendship, team play, exercise skill, and enjoyment, respectively.

2.2.5. The Subjective Adjustment to School Scale

In order to measure subjective adjustment to school environment, we used the Subjective Adjustment to School Scale developed by Okubo (2005). This scale consists of 30 items falling under four sub-scales: Sense of comfort, existence of task and purpose, feelings of acceptance and trust, and absence of feelings of inferiority. This scale measures and evaluates an individual's adaptive state from the viewpoint of cognition and emotion in terms of compatibility in the person-environment fit. Specifically, responses focus on the respondent's thinking and perception regarding the lifestyles of recent university students on a five-level scale ranging from (1)

not applicable to (5) *extremely applicable*. Items included in the feelings of acceptance and trust are reversed, means that lower scores indicate stronger adjusted perceptions. The reliability and validity of this scale has been confirmed (Okubo, 2005).

2.3. Procedure

The questionnaire was conducted by the author and research collaborators during class hours or following lectures. Prior to the survey, the purpose and contents of the survey were explained to the participants. Also, they were informed that survey cooperation was voluntary and could be interrupted at any time during the response period. Participation was irrelevant to their class grades and evaluations, and replies were anonymous and confidential, with individual results presented on the face sheet used only for statistical analysis. In addition, replies to the questionnaire were made only following an oral explanation. After participants completed the questionnaires, they were collected on the spot. The time required to complete the questionnaire was approximately 10 minutes. Also, in order to examine test-retest reliability, we asked them to respond to an identical questionnaire one week later. In order to correlate the two questionnaires of the respondents, participants were asked to enter their student number.

2.4. Data analysis

To construct the scale, item analyses were performed prior to exploratory factor analysis. Subsequently, Cronbach's α coefficients and correlation coefficients were calculated to examine reliability and validity, and further exploratory factor analysis was performed. In order to clarify the features of the scale, analysis of variance was carried out. In addition, Structural Equation Modeling (SEM) was conducted to examine the effects of the identified factors on subjective adjustment to university. For the above statistical analyses, SPSS Statistics 22 (IBM Japan) was used; also, Amos 23 (IBM Japan) was used for confirmatory factor analysis and a model analysis of inter-variable influence by SEM.

3. Results

3.1. Participants' characteristics and selecting status of physical education classes

Participants enrolled in the faculty of engineering amounted to 44.5%, followed by science and technology (21.2%) and medicine (8.8%), with the remainder enrolled in one of 13 other faculties. As for sex, male respondents numbered 1,767 (73.3%; female: $n=640$; 26.5%). Ages ranged from 18 to 29 years, with an average of 18.5 years ($SD=0.79$).

Among physical education classes, badminton was the most popular at 17.1%, followed by soccer (12.9%) and table tennis (10.2%). Other sports included tennis, jogging, basketball, volleyball, trampoline, and judo. In addition, 72.5% of the participants responded that they had zero absences from physical education classes, while 26.4% of the participants reported 1–3 absences and 1.1% had 4 or more absences, an extremely small percentage.

In addition, the data of 433 male (60.1%), 285 female (39.6%), and 2 undisclosed (0.3%) ($n=720$) participants were used to examine the scale and feature validity by athletic activity, with the following results: 428 participants (59.4%; 253 male, 174 female, 1 undisclosed) were involved in individual sports activities such as jogging, tennis, golf, badminton, dance, table tennis, judo, fitness training, and recreational sports, while 214 participants (29.7%; 145 male, 43 female, 1 undisclosed) were involved in group sports activities such as volleyball, football, and softball. Finally, 78 participants (10.8%; 35 male, 43 female) were involved in outdoor sports activities such as skiing and wind surfing.

3.2. Item analysis and examination of the scale composition

First, we examined whether the items responded by participants were appropriate as scale items using the following item analysis. In the response distribution, the extreme options (*completely disagree* and *completely agree*) accounted for over 70% of total items (ceiling and floor effect) and standard deviation values; furthermore, items with a small standard deviation (less than 1) were considered, but no corresponding items were found. Next, item-total correlation analysis for "increased total num-

ber of close friends of opposite sex” yielded a correlation coefficient ($r = .46$) significant at the 0.1% level, which was lower than for the other items ($r = .53-.75$), and thus this item was excluded from further analysis to preserve internal consistency. Subsequently, as a result of exploratory factor analysis (maximum likelihood method and promax rotation) with respect to the remaining items, items with a factor loading of .40 or less were identified and deleted, after which a similar factor analysis was performed in which items with small factor loadings and those with large loads of .35 or more were omitted. From the factors with eigenvalues greater than 1.00, indicating the possibility of factor interpretation, we finally adopted a five-factor solution consisting of 25 items. The resulting scale confirmed here we have named the Perceived Benefits Scale of University First-Year Physical Education classes (abbreviated as PBS-FYPE).

The first factor comprised six items, including “acquiring basic motor skills” and “understanding effective practice methods to improve motor skills.” As these items relate to motor skill improvement and practice methods to acquire motor skills, the first factor was termed “acquisition of motor skills and training methods.” The second factor includes six items, including “feeling the pleasure playing as a team,” “learn mutual help facilitates winning” and “understand the importance of cooperation in a team and group.” These can be interpreted as factors related to the recognition of interpersonal communication skills, and thus were termed “understanding the importance of cooperative play and improvement of communication skills.” The third factor consists of four items, including “fully refresh myself from stressful feelings” and “fully relieve stress.” These can be interpreted as factors related to stress relief and enhancement of pleasant feelings and thus were termed “stress coping and arousal of positive feelings.” The fourth factor consists of six items, including “increase physical fitness level than before” and “becoming less tired than before.” These can be interpreted as factors related to maintaining and improving physical fitness and increasing opportunities for exercise and are thus termed “improvements in physical fitness and physical activity.” Finally, the fifth factor consists of three items, including “become more conscious of a regulated lifestyle” and “adopt a regulated lifestyle.” These can be interpreted as factors

related to consciousness and acquisition of a regular lifestyle and thus are termed “establishment of regular lifestyles.” From the results, item scores corresponding to the factors of subjective benefits derived from the first-year physical education classes were summed up as the respective subscale scores, and the scores of the five subscales were summed up as the total score. **Table 1** shows factor loadings, factor correlations and item scores of the PBS-FYPE; **Table 2** shows basic statistics for each subscale score. In addition, **Table 3** shows a correspondence between PBS-FYPE and the qualitative categories in a previous study (Nishida et al., 2015) as a reference for the scale composition.

3.3. Examination of reliability and validity

We examined the reliability of PBS-FYPE in two ways. First, regarding internal consistency, Cronbach’s α coefficient was calculated for each subscale (**Table 1**), yielding values of $\alpha = .79-.89$. Next, regarding the stability aspect of the scale, values of $r = .67-.84$ (with p of both $< .001$) were obtained from the moment correlation coefficients as an indicator of test-retest reliability (**Table 1**).

In addition, confirmatory factor analysis was conducted to examine the validity of the factor structure of the Perceived Benefits Scale of University First-Year Physical Education classes. Assuming that the Perceived Benefits of University First-Year Physical Education classes comprises the factors obtained from exploratory factor analysis, each factor is taken as a latent variable. Analysis was carried out with a model assuming that the items corresponding to each of the five latent variables of PBS-FYPE affected each other, and that covariance existed between all latent variables as a result of inter-factor correlation. To evaluate the model, we used the fit indices of GFI, AGFI, CFI, and RMSEA following Yamamoto and Onodera (2001) and Asano et al. (2007). GFI, AGFI, and CFI are judged to be a good model fit for coefficients larger than .90, and RMSEA when less than .08. Analysis results (**Figure 1**) show the fitness indices of the model to be GFI = .885, AGFI = .859, CFI = .906, and RMSEA = .072. Although GFI and AGFI had slightly lower values than the reference values, the remaining fit indices had satisfactory values. Also, the path coefficient from each latent variable to each item was .55–.87, which was the highest value be-

Table 1 Results of exploratory factor analysis (Maximum likelihood method; Promax rotation) of the “Perceived Benefits Scale in university First-Year PE classes (PBS-FYPE)”. Respondents report: “I was able to …”.

Item	M	SD	Factor loading					Communality
			F1	F2	F3	F4	F5	
F1: Acquisition of motor skills and training methods ($\alpha = .89, r = .78^{***}$)								
X1 Acquire basic motor skills.	4.82	1.30	.87	-.06	.08	-.12	.00	.63
X2 Understand effective practice methods to improve motor skills.	4.44	1.37	.78	-.04	-.01	.00	.06	.61
X3 Acquire advanced motor skills.	4.46	1.41	.78	-.05	-.05	.09	.01	.59
X4 Learn the effective ways to improve my motor skills.	4.40	1.39	.78	.02	-.03	.10	-.03	.70
X5 Perform better using my body than before.	4.54	1.37	.68	.17	.01	.05	-.04	.67
X6 Fully understand the rules of the athletic event.	5.12	1.35	.51	.23	.04	-.10	-.03	.39
F2: Understanding the importance of cooperative play and improvement of communication skills ($\alpha = .86, r = .81^{***}$)								
X7 Feel the pleasure of playing as a team.	4.80	1.60	.00	.88	-.06	.07	-.07	.74
X8 Learn mutual help facilitates winning.	4.77	1.62	.03	.85	-.11	.05	-.05	.64
X9 Understand the importance of cooperation in a team and group.	5.21	1.26	.06	.69	.03	-.07	.10	.59
X10 Interact with various people regardless of motor skill level.	5.09	1.35	.05	.59	.06	.01	.03	.47
X11 Make new good friends.	5.18	1.41	-.07	.49	.06	.02	.08	.29
X12 Encourage my friends.	4.70	1.21	.06	.42	.06	.04	.20	.43
F3: Stress coping and arousal of positive feelings ($\alpha = .89, r = .84^{***}$)								
X13 Fully refresh myself from stressful feelings.	5.05	1.46	-.01	-.05	.96	-.02	.01	.82
X14 Fully relieve stress.	5.05	1.47	-.04	-.08	.92	.00	.07	.76
X15 Feel so refreshing.	5.31	1.39	.05	.16	.66	.05	-.04	.68
X16 Feel excitement.	5.04	1.42	.17	.08	.52	.12	-.11	.55
F4: Improvements in physical fitness and physical activity ($\alpha = .82, r = .80^{***}$)								
X17 Increase physical fitness level than before.	4.06	1.42	-.01	-.05	-.02	.81	.05	.63
X18 Become less tired than before.	3.88	1.45	.07	-.04	-.03	.72	.09	.61
X19 Exercise until exhausted.	4.29	1.81	-.13	.18	.06	.57	-.12	.35
X20 Maintain the level of physical fitness.	4.52	1.41	.14	-.03	.09	.57	.01	.51
X21 Increase extracurricular exercise opportunities.	3.59	1.71	.16	.00	-.04	.47	.10	.39
X22 Have enough time to move my body.	5.46	1.23	-.13	.25	.13	.45	-.03	.40
F5: Establishment of regular lifestyles ($\alpha = .79, r = .67^{***}$)								
X23 Become more conscious of a regulated lifestyle.	4.19	1.46	-.06	.01	-.01	.00	.91	.78
X24 Adopt a regulated lifestyle.	3.99	1.41	.10	-.05	-.02	.11	.70	.63
X25 Find the importance of maintaining a regulated lifestyle.	5.02	1.35	.02	.25	.06	-.10	.49	.40
Factor correlation			—					
F2			.65 ^{***}	—				
F3			.60 ^{***}	.62 ^{***}	—			
F4			.65 ^{***}	.64 ^{***}	.63 ^{***}	—		
F5			.55 ^{***}	.54 ^{***}	.41 ^{***}	.55 ^{***}	—	

Note. r shows test-retest reliability coefficient

*** $p < .001$

tween the first factor and the fourth factor in inter-factor path coefficients. In addition, test statistics exceeded 1.96 for all items ($p < .05$).

In addition, in order to examine the criterion-related validity (concurrent validity) of the PBS-FYPE, the ECSUPEC (Shimizu et al., 2012) and ESUPEC (Shimamoto & Ishii, 2007) were consid-

ered as having strongly relevant components. Also, regarding PBS-FYPE and ECSUPEC (Table 4), a moderately positive correlation coefficient was shown between “understanding the importance of cooperative play and improvement of communication skills” and “promotion of interpersonal relationships,” as well as “establishment of regular

Table 2 Basic statistics of the “Perceived Benefits Scale in university First-Year PE classes (PBS-FYPE)”.

Subscales	Score range	Min	Max	M	SD
Acquisition of motor skills and training methods	6–42	6.00	42.00	27.76	6.59
Understanding the importance of cooperative play and improvement of communication skills	6–42	6.00	42.00	29.74	6.53
Stress coping and arousal of positive feelings	4–28	4.00	28.00	20.45	4.98
Improvements in physical fitness and physical activity	6–42	6.00	42.00	25.80	6.61
Establishment of regular lifestyles	3–21	3.00	21.00	13.20	3.54
Total score	25–175	29.00	175.00	116.96	23.47

Table 3 Correspondence between the “Perceived Benefits Scale in university First-Year PE classes (PBS-FYPE)” and qualitative categories (Nishida et al., 2015).

Subscales of PBS-FYPE	Qualitative categories of university P.E. classes (Nishida et al., 2015)
Acquisition of motor skills and training methods	Acquisition and improvement of motor skills, understanding exercise methods and rules
Understanding the importance of cooperative play and improvement of communication skills	Formation and expansion of friendships, improvement of communication skills, understanding importance of team play
Stress coping and arousal of positive feelings	Feeling of enjoyment, stress relief
Improvements in physical fitness and physical activity	Increase physical fitness, exercise frequency
Establishment of regular lifestyles	Lifestyle improvement

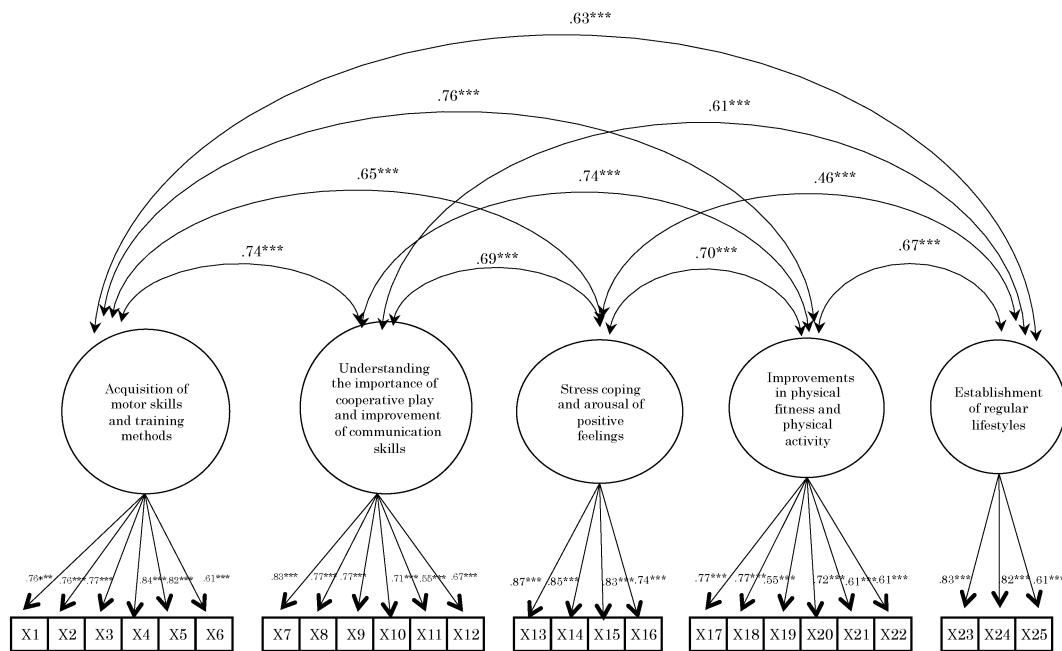


Figure 1 Results of confirmatory factor analysis of the “Perceived Benefits Scale in university First-Year PE classes (PBS-FYPE).”

Note. GFI = .885, AGFI = .859, CFI = .906, RMSEA = .072

*** $p < .001$

Error variables are omitted from the figure.

lifestyles” and “lifestyle improvement” ($p < .001$ for both). At the same time, regarding PBS-FYPE and ESUPEC (Table 4), a strong positive correlation coefficient was found between “understanding

the importance of cooperative play and improvement of communication skills” and “cooperation” ($p < .001$). Also, a significant moderately positive correlation coefficient was found between “acqui-

Table 4 Results of correlation analysis between the “Perceived Benefits Scale in university First-Year PE classes (PBS-FYPE)” and other scales.

Subscales	ECSUPEC (<i>n</i> = 2,412)			ESUPEC (<i>n</i> = 720)			
	Diet effect	Promotion for interpersonal relationship	Lifestyle improvement	Self-disclosure	Cooperation	Challenge	Enjoyment
Acquisition of motor skills and training methods	.36***	.44***	.39***	.34***	.35***	.52***	.38***
Understanding the importance of cooperative play and improvement of communication skills	.32***	.68***	.39***	.39***	.73***	.35***	.47***
Stress coping and arousal of positive feelings	.35***	.50***	.42***	.35***	.34***	.33***	.48***
Improvements in physical fitness and physical activity	.47***	.43***	.47***	.28***	.43***	.42***	.29***
Establishment of regular lifestyles	.35***	.40***	.45***	.28***	.30***	.32***	.26***

Note. *** *p* < .001

Table 5 Results of athletic events differences of the “Perceived Benefits Scale in university First-Year PE classes (PBS-FYPE)”.

Subscales	Individual athletic events (A) (<i>n</i> = 428)	Group athletic events (B) (<i>n</i> = 214)	Outdoor athletic events (C) (<i>n</i> = 78)	<i>F</i> Values	Multiple comparison Bonferroni test
Acquisition of motor skills and training methods	28.37 (5.86)	27.94 (6.48)	33.12 (4.87)	23.79***	A < C***, B < C***
Understanding the importance of cooperative play and improvement of communication skills	26.82 (6.57)	31.79 (5.61)	30.86 (4.97)	51.95***	A < B***, A < C***
Stress coping and arousal of positive feelings	20.04 (4.87)	20.99 (4.86)	23.09 (3.42)	14.45***	A < C***, B < C**
Improvements in physical fitness and physical activity	24.20 (6.69)	26.00 (6.51)	30.11 (4.59)	29.10***	A < B**, A < C***, B < C***
Establishment of regular lifestyles	12.30 (3.68)	12.40 (3.71)	16.77 (3.00)	52.13***	A < C***, B < C***
Total score	111.74 (21.57)	119.11 (22.90)	133.94 (15.46)	38.02***	A < B***, A < C***, B < C***

Note. () indicates SD. Multiple comparison of A, B, C indicates respectively individual, group, and outdoor athletic events. ** *p* < .01, *** *p* < .001

tion of motor skills and training methods” and “challenges” (*p* < .001).

3.4. Features of perceived benefits based on contents (athletic activities) of first-year physical education classes

In first-year physical education classes, the class content differed greatly between athletic activities; thus, it may be assumed that there will be differences in perceived benefits. Therefore, in order to examine the differences in perceived benefits due to differences in class content, each subscale score measured by PBS-FYPE was taken as a dependent variable, and the category of individual, group, or

outdoor athletic activity was selected as the independent variable. As shown in **Table 5**, ANOVA found significant differences among the three groups on all subscales, necessitating multiple comparison by the Bonferroni method. Results indicated that outdoor athletic activities had significantly higher scores for “acquisition of motor skills and training methods,” “stress coping and arousal of positive feelings,” and “establishment of regular lifestyles” than individual and group activities. Group and outdoor athletic activities scored significantly higher on “understanding the importance of cooperative play and improvement of communication skills” than individual activities. Regarding “improvements in physical fitness and physical activity”

scores, group and outdoor athletic activities displayed significantly higher scores than individual activities; also, outdoor athletic activities were also significantly higher on this subscale than group activities. Furthermore, as a result of similar analyses of the total scores of PBS-FYPE, group and outdoor athletic activities had significantly higher scores than individual activities; also, outdoor athletic activities were also significantly higher in this subscale than group activities.

3.5. Examination of the influence of the perceived benefits of first-year physical education classes on adjustment to university life

First, descriptive statistics for each subscale were calculated to clarify the degree of adjustment to university of each participant, yielding means for each subscale of 40.17 (*SD*=7.74) for “sense of comfort,” 27.28 (*SD*=4.59) for “existence of task and purpose,” 17.80 (*SD*=4.39) for “feelings of acceptance and trust,” and 18.88 (*SD*=4.14) for “absence of feelings of inferiority.”

Next, to examine the influence of the perceived benefits of first-year physical education on adjustment to university life, correlation analysis was carried out to clarify the relationship between each subscale score of PBS-FYPE and the subjective adjustment scale to school. As shown in **Table 6**, a significant correlation was found among a plurality of variables. Next, non-significant relationships were excluded as irrelevant to calculated correlation coefficients (correlations between “acquisition of motor skills and training methods,” “under-

standing the importance of cooperative play and improvement of communication skills,” “establishment of regular lifestyles,” and “absence of feelings of inferiority”). Subsequently, analysis by structural equation modeling based on maximum likelihood estimation method was conducted of a hypothetical model in which the perceived benefits of the first year’s physical education classes influenced the sense of adjustment to university life, as was the purpose of the initial model. Results indicated paths inconsistent with the overall results in the areas of “acquisition of motor skills and training methods”—“sense of comfort”; “stress coping and arousal of positive feelings”—“feelings of acceptance and trust”; and “improvements in physical fitness and physical activity”—“sense of comfort.” For this reason, re-analyzing the slightly-modified initial model by deleting these insignificant paths resulted in goodness-of-fit indices of GFI = .998, AGFI=.987, CFI=.999, and RMSEA = .029. These data were considered fully fitted and thus this model was adopted as the final model. Subsequently, in order to verify the influences on the sense of university adjustment, confirmation of the previous analysis of the perceived benefits of first-year physical education among participants was conducted by dividing activities into individual and group athletic activities (1,483 and 929 participants were classified as doing individual and group activities, respectively) so as to allow simultaneous analyses of multiple groups to be conducted without equality constraints among groups. As mentioned above, outdoor athletic activities generally exceeded the other activities in perceived benefits. However,

Table 6 Results of correlation analysis of the “Perceived Benefits Scale in university First-Year PE classes (PBS-FYPE)” and adjustment to university life.

Subscale	1	2	3	4	5	6	7	8	9
1 Acquisition of motor skills and training methods	—								
2 Understanding the importance of cooperative play and improvement of communication skills	.65***	—							
3 Stress coping and arousal of positive feelings	.60***	.62***	—						
4 Improvements in physical fitness and physical activity	.65***	.64***	.63***	—					
5 Establishment of regular lifestyles	.55***	.54***	.41***	.55***	—				
6 Sense of comfort	.38***	.47***	.42***	.35***	.31***	—			
7 Existence of task and purpose	.37***	.41***	.41***	.31***	.29***	.71***	—		
8 Feelings of acceptance and trust	.37***	.39***	.29***	.34***	.30***	.65***	.51***	—	
9 Absence of feelings of inferiority	.03	.03	.05*	-.06*	-.03	.19***	.18***	.07**	—

Note. * *p* < .05, ** *p* < .01, *** *p* < .001

outdoor athletic activities are generally held in a camping format outside the university during long vacations, which are regarded as extraordinary learning. In addition, the sense of adjustment to the school used in this study depends on whether the subjects match their school environments—that is, we are attempting to measure adjustment to daily university life from the viewpoint of adaptability between individuals and environment. Based on the differences in these scenarios (on-site vs off-site classes), it is difficult to theoretically account for an influence of the perceived benefits of outdoor athletic activities on university adjustment; hence, this research ignores off-site training in order to examine adjustment perceptions. **Figure 2** shows that individual athletic activities that foster a “sense of com-

fort” at university were “understanding the importance of cooperative play and improvement of communication skills,” “stress coping and arousal of positive feelings,” and “establishment of regular lifestyles” with a coefficient of determination (R^2) of .24. In addition, all subscales of perceived benefits of first-year physical education classes had a significant influence on “existence of task and purpose,” with a coefficient of determination of .17. Here, all subscales except for “improvements in physical fitness and physical activity” showed a positive influence. Other subscales except for “stress coping and arousal of positive feelings” and “improvements in physical fitness and physical activity” showed a positive influence on “feelings of acceptance and trust,” with a coefficient of deter-

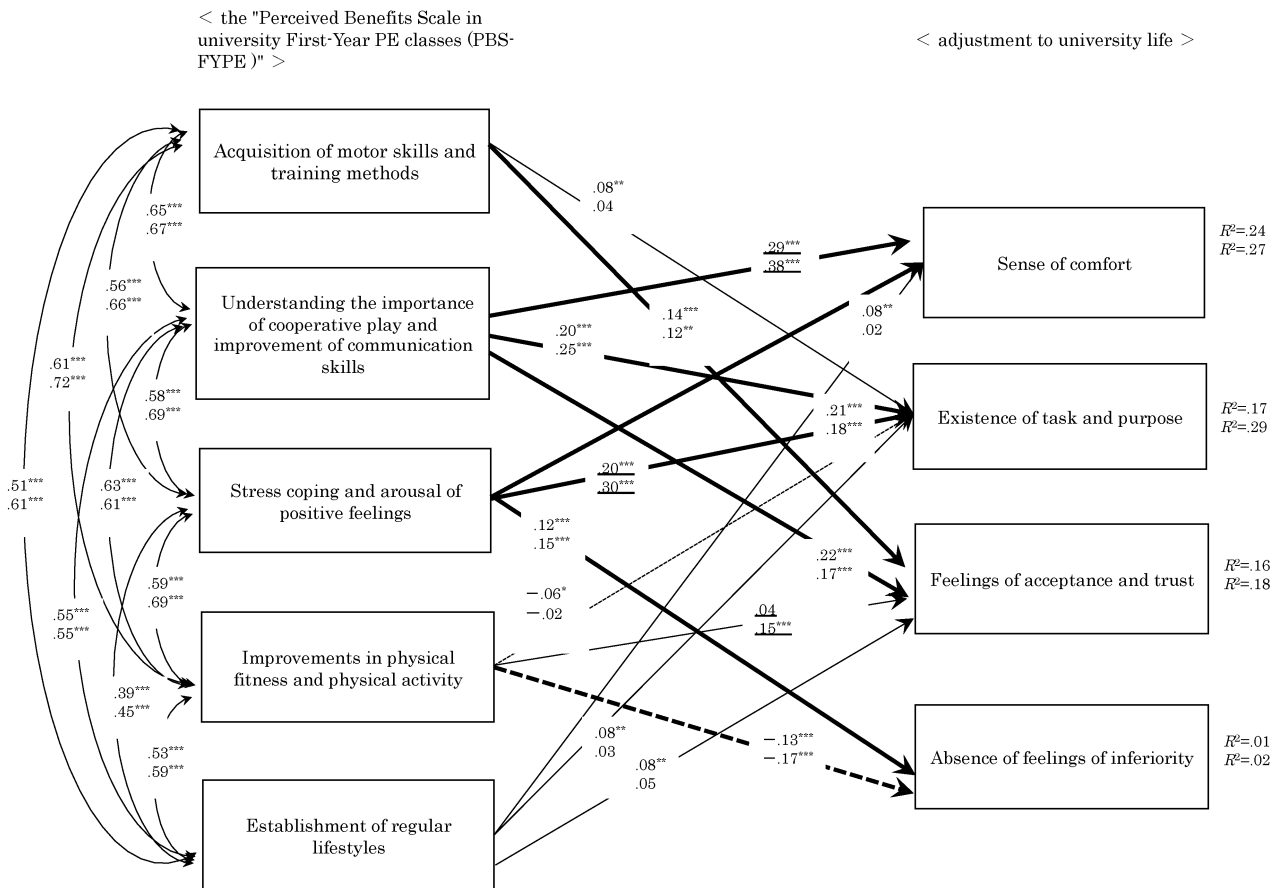


Figure 2 Results of simultaneous analysis in multiple populations relating of the “Perceived Benefits Scale in university First-Year PE classes (PBS-FYPE)” on adjustmet to university life (by athletic events)

Note. Values on each figure line were standardized estimate values; the upper row shows values of individual athletic events ($n = 1.483$); the lower row, values of group atheletic events ($n = 929$).

The solid line shows positive influence; the broken line shows negative influence.

The bold line shows significant influence common to individual and group events; the thin line shows any significant influence.

The underline shows significant differences of 5% standard between path coefficients.

Error variables are omitted from the figure.

* $p < .05$, ** $p < .01$, *** $p < .001$

mination of .16. Next, “stress coping and arousal of positive feelings” showed a positive influence and “improvements in physical fitness and physical activity” showed a negative influence on “absence of feelings of inferiority”; the coefficient of determination was .01.

Similarly, group athletic activities resulted in significant positive influence on “sense of comfort” and “existence of task and purpose” in terms of adjustment to university, with “understanding the importance of cooperative play and improvement of communication skills,” and “stress coping and arousal of positive feelings” showing significant positive coefficients of determination of .27 and .29, respectively. Furthermore, “feelings of acceptance and trust” was positively correlated with “acquisition of motor skills and training methods,” “understanding the importance of cooperative play and improvement of communication skills,” and “improvements in physical fitness and physical activity,” with a coefficient of determination of .18. Finally, “stress coping and arousal of positive feelings” showed a positive influence on “absence of feelings of inferiority” and “improvements in physical fitness and physical activity” a negative influence, with a coefficient of determination of .02.

4. Discussion

The purpose of this study was to examine the construction of a perceived benefits scale for first-year university students regarding physical education classes so as to further examine the reliability and validity of scales, as well as examine the influences of perceived benefits of first-year physical education classes on adjustment to university life.

4.1. Characteristics of participants

The participants of this study were about 3,000 first-year students enrolled in the so-called general faculties who did not have physical education/sports science as their major. The participants had a relatively high proportion of engineering students, and were largely male. In Japan, the proportion of students belonging to departments of the social sciences is highest, followed by engineering; in recent years, women have made up about 40% of undergraduate students (MEXT, 2015b). Less than 30 % of the participants in this study were female,

which is not considered to indicate bias towards specific faculties or gender. Physical education classes also comprise various types of practical indoor and outdoor activities similar to those examined by Sugiyama (2010), and which are conventionally conducted in university physical education classes. Furthermore, attendance status showed an attendance rate of three people out of four, a ratio higher than that found in Nishida et al. (2015), indicating the active attitude of the participants.

4.2. The Perceived Benefits Scale of University First-Year Physical Education classes (PBS-FYPE) and its reliability and validity

Prior to our research, a linguistic analysis of the perceived benefits of physical education classes at university based on Nishida et al. (2015) was performed so that scale items could be prepared by expert consultation, and exploratory factor analysis identified five factors. In light of these qualitative categories (**Table 3**), factors were established of “establishment of regular lifestyles,” “acquisition of motor skills and training methods,” “understanding the importance of cooperative play and improvement of communication skills,” and “improvements in physical fitness and physical activity.” These results appear to arise from the differences in data collection and analysis in the qualitative category extraction process. That is, it can be inferred that in linguistic analysis, a relatively large number of qualitative categories were extracted by morphological analysis, while in quantitative analysis, a few common factors were found through correlations between variables that were consolidated into the same factor. Although not the same as the qualitative categories, the names of the factors of the PBS-FYPE are not considered to greatly differ in content because they were named in consideration of multiple qualitative categories while maintaining concreteness. Therefore, it may be said that PBS-FYPE can evaluate the 10 generally accepted qualitative categories. In addition, a moderate positive correlation was shown between each factor of PBS-FYPE, indicating that the perceived benefits of first-year physical education classes are inter correlated.

Next, the reliability and validity of the developed subscales were examined. The reliability is higher for coefficient values closer to 1; though a clear cri-

terion is lacking, a value of around .70 is desired (Sugawara, 2000). This indicates this scale generally has high reliability and the subscales sufficient internal consistency and stability. In addition, confirmatory factor analysis revealed that although GFI and AGFI had slightly lower values than the standard, as values conforming to the standard were indicated and other fitness indices met the criteria, we did not modify the model in this respect. Since the obtained model roughly conforms to the data and it was possible to confirm a five-factor model with some stability, this scale may be considered to have construct validity. Furthermore, we investigated the correlation with scales containing strongly related constituent concepts; these were found to be consistent with the prediction and thus to have criterion-related validity. The above confirm that the PBS-FYPE possesses both reliability and validity as a measure of the perceived benefits of university students in first-year physical education classes.

In recent years, academic achievement has been evaluated against the background of the need to clearly show benefits to society of university learning. PROG (Progress Report On Generic skills), for example, is a widely-known method of quantitative measurement of such generic skills as problem solving skills and basic task skills (Narita, 2014), and is a test that measures the degree of students' trained ability and subjective learning gained from university education. Currently, assessments of teaching by students themselves are the primary method of determining learning outcomes. In many cases, evaluation questionnaires are carried out with common content and formats for each subject. This limits the evaluation of unique learning outcomes. On the other hand, the newly-developed PBS-FYPE is an index with reliability and validity that can quantitatively measure unique subjective learning experiences associated with first-year physical education classes. The attractiveness of the PBS-FYPE measurement method is that it was not created to assess arbitrary methods of particular physical education teachers and their views of education, but was based on the subjective learning of first-year students who participated in physical education classes. Therefore, the PBS-FYPE can comprehensively measure learning along individual scales in physical education classes at universities using 25 items under five subscales; it can be conducted after the final class, midway through classes, or even af-

ter the initial class within such a short period of time as five minutes to confirm learning results. For this reason, our method can be considered useful for teachers as well as the students themselves as a useful evaluation tool to objectively understand students' degrees of learning.

4.3. Differences in perceived benefits of first-year physical education classes (athletic activities)

First, the effects of types of activities (individual, group, or outdoor athletic activities) on the perceived benefits of first-year physical education were examined, and it was found that outdoor athletic activities resulted in generally higher scores among participants. These results were similar to those of previous studies that examined the effects of outdoor education classes. A study by Isogai (2005) examining the effects of ski classes at two universities on self-efficacy found that improved ski effectiveness of the students after classes and differences in skiing effectiveness due to cognitive differences resulting from ski skill improvements indicated differences in cognitive perception. As the skills for skiing are easy to acquire and progress is easily measurable (Isogai, 2005), this could serve as an accurate estimate of the acquisition of self-confidence motor skills. Furthermore, it has been reported that the stress coping and changes of moods involved during ski classes are easier to measure than in practical classes at university (Tada, 1998). This is probably due to skiing being different from other outdoor sports, in which distraction and other cathartic effects easily arise that may be involved with stress coping and the formation of positive feelings. In addition, it is assumed that in camp-style classes that involve living together with other students, it is easy to establish a regular life styles, and sharing classes and coordinating with others facilitate one's own life management.

Next, differences were apparent when comparing individual and group athletic activities regarding "understanding the importance of cooperative play and improvement of communication skills" and "improvements in physical fitness and physical activity," which were higher in group athletic activities. "Understanding the importance of cooperative play and improvement of communication skills" involves team play or conducting sports activities requiring mutual help and communication. While indi-

vidual athletic activities provide opportunities to improve personal skills and achieve goals, group activities often provide opportunities to contribute to achieving targets as member of a team and thus assist students in working toward common goals. Due to the differences in such activities, it is inferred that benefits of group athletic activities accrue more substantially. Regarding “improvements in physical fitness and physical activity” for individual athletic activities, it has been reported that badminton requires about 2,800 to 3,800 steps (Yoshida et al., 1981) and tennis about 3,200 to 3,400 steps (Yoneda et al., 1983), while in group athletic activities, soccer requires about 4,500 to 5,500 steps (Nishiwaki et al., 2014a) and softball about 2,900 steps to 3,700 steps (Yoshida et al., 1981). In addition, activities such as volleyball and soccer are categorized as vigorous exercise (exceeding 6 METs) (Lee & Thompson, 2009/2011). Similar to previous research, our research results reflect the actual amount of exercise and show that group athletic activities result in somewhat higher effectiveness. In addition, it has been clarified that the average number of steps taken daily by university students in the past 10 years has decreased by about 500, with the average number of steps at 8,149 in 2003 and 7,684 in 2012 (Nishiwaki et al., 2014b), and thus the perceived benefits of securing a certain amount of exercise and strength through physical fitness via physical education classes have an evident value.

4.4. Influence of perceived benefits of first-year physical education classes on the adjustment to university life

Initially, the participants’ mean value of adjustment to university life was generally higher than the standard value of university students (male and female means) indicated by Okubo (2005). The scores regarding adjustment to university indicated that many participants might already have been generally adjusted to the university environment.

Thus, we examined the influence of the perceived benefits of first-year physical education classes on university adjustment for both groups of individual and group athletic activities. Perceived benefits were found to have added to all subscales of university adjustment, which was clearly an influential differential. This result indicates that several factors of perceived benefits of first-year physical education

classes are effective in explaining the adjustment to university life.

Below, we discuss the main influences of perceptions regarding adjustment to university life. First, “sense of comfort” was relatively well-explained by the explanation rate values (24% and 27% respectively) for both individual and group athletic activities. Among these, “sense of comfort” increased in conjunction with “understanding the importance of cooperative play and improvement of communication skills,” and its influence was stronger in group than in individual athletic activities. “Sense of comfort” does not indicate temporal existence in groups but rather the feeling of melting into one’s surroundings and a sense of security. Previously, improvement in the “sense of comfort” was found as a result of physical education classes intended to support interpersonal communication skills (Nishida et al., 2009); our results are similar to those of the previous study. It is possible that mutual involvement may also occur in individual athletic activities, but group athletic activities reveal higher values of cooperation with other students through personal involvement, and this suggests the establishment of intimate relationships, which can be said to enable possibilities of strong influence over merits of comfortableness.

Next, regarding “existence of task and purpose,” a single path was drawn from all perceived benefits of first-year physical education classes in individual athletic activities, while group athletic activities displayed two paths with a relatively high explanation rate (29%). In particular, both athletic activities exhibited a strong influence of “understanding the importance of cooperative play and improvement of communication skills” and “stress coping and arousal of positive feelings.” In particular, we found that the higher they are, the higher “existence of task and purpose” will become. “Existence of task and purpose” asks about fulfillment and growth as well as a sense of passion to accomplish desired tasks. It can be inferred that students’ interests and concern for university life vary in many ways, but in physical education classes, mutual cooperation with pleasurable feelings, mutual communication, and the establishment of good friendships also can be interpreted as a link for first-year students to discover purpose and fulfillment in university life and more. What is more, this subscale was confirmed to have a moderate correlation with

the depression scale, suggesting a relationship with mental health (Okubo, 2005). Acquisition of the ability to cope with stress and refresh one's feelings by learning in physical education can thus be viewed as related to mental health improvement, and it is thought that improvements of mental health lead to fulfillment and a feeling of growth. This is particularly evident in group athletic activities, and can be interpreted as a tendency in which improved mental health through mutual participation leads to fullness and growth.

In addition, a clear path could be drawn to "feelings of acceptance and trust," indicating a feeling of trust and acceptance, from all subscales except "stress coping and arousal of positive feelings." In particular, while not especially strong influential, a characteristic path from "improvements in physical fitness and physical activity," derived from group athletic activities, to "establishment of regular lifestyles" in individual athletic activities was apparent. Especially noteworthy was that the perceived benefits participants acquired through sports activities accompanied by fatigue were beneficial for both their mutual relationship goals and their physical fitness, and these were likely extended to increased confidence and expectations of their university life environment.

Finally, similar perceived benefits of "stress coping and arousal of positive feelings" and "improvements in physical fitness and physical activity" were influenced in the groups who practiced individual and group athletic activities by "absence of feelings of inferiority," but the correlation was extremely low (1% and 2%, respectively). This is likely due to the fact that while "stress coping and arousal of positive feelings" had a positive influence, "improvements in physical fitness and physical activity" had a negative influence, and thus they canceled each other out, leading to little influence. It is possible that the perceived benefits of first-year physical education classes positively influence the sense of adjustment towards university life; this point requires further study.

4.5. Limitations of this study and future tasks

Finally, let us turn to the limitations of this study and future topics to be explored. First, this study aimed at classifying athletic activities in order to clarify the characteristics of our perceived benefits

scale regarding first-year physical education classes and to calculate subscale scores by each activities. Although our study confirmed the existence of differences between athletic activities, detailed information on the scores calculated by physical education content was insufficient. Numerous related factors such as teaching philosophy, the guidance behavior of the teachers in charge, contents of experience, and student characteristics remain to be studied, and they thus require identification in future studies to take them into account and identify factors that affect perceived benefits. To do so, it is also necessary to record the details and development of individual classes in detail so as to compile the characteristics of the perceived benefits in a particular case.

Second, this study involved a partial retrospective investigation and estimated a model based on temporal precedence to elucidate the influence of perceived benefits of first-year physical education classes on feelings of adjustment towards university life. However, it was not possible to elucidate causal relations by considering changes in actual elapsed time. Additionally, it has been pointed out that our method has difficulty in eliminating the possibility of contrary causality (Takahira et al., 2006). Therefore, it is expected that an estimation of strict causal relationships will be carried out in the future. To do so, it will be necessary to conduct a longitudinal investigation, such as a panel survey, as per Shimamoto and Ishii (2010) and analyze the data using a cross-lagged effect model or synchronous effect model.

Third, this study examined the influence of adjustment to university life only of the perceived benefits of first-year physical education classes. However, the possibility that further studies conducted at other universities might find that learning also affect adjustment to university should also be also considered. It is also necessary to examine the relative influences of first-year physical education classes, including related factors. Although the above-mentioned multitude of problems remains, this study will allow the further development of research to effectively identify and verify new values of physical education at the university using the PBS-FYPE method. Although this study focused on the influence of physical education on adjustment to university life, the perceived benefits of physical education classes are influenced by their subsequent

spreading effects on school attendance status and grades and evaluations, self-growth regarding university life, and self-esteem. Further evidence of the benefits of practical physical education classes at universities is expected to be discovered.

5. Conclusions

In this study, we applied our new measurement scale to construct the Perceived Benefits Scale in University First-Year Physical Education classes (PBS-FYPE), comprising five subscales (“acquisition of motor skills and training methods,” “understanding the importance of cooperative play and improvement of communication skills,” “stress coping and arousal of positive feelings,” “improvements in physical fitness and physical activity,” and “establishment of regular lifestyles”). Subsequently, it was confirmed that this scale shows sufficient reliability and validity, and that scale scores differ among participants who practice individually or in groups. In addition, although our results suggest that the perceived benefits of first-year physical education classes might influence the adjustment to university life, differences among athletic activities should also be taken into account. Finally, the limitations of this research and future issues such as related factors of PBS-FYPE and the need for longitudinal investigation were discussed.

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References

- Asano, H., Suzuki, T., and Kojima, T. (2007). Nyumon kyoubunsan kouzou bunseki no jissai [Introduction: Practice of covariance structure analysis]. Tokyo: Kodansha. (in Japanese)
- Bailey, R., Armour, K., Kirk, D., Jess, M., Pickup, I., Sandford, R., and BERA physical education and sport pedagogy special interest group (2009). The educational benefits claimed for physical education and school sport: an academic review. *Res. Pap. Educ*, 24: 1-27.
- Central Council for Education (2012). Arata na mirai wo kizuku tame no daigaku kyouiku no shituteki tenkan ni mukete: Syougai manabi tsuzuke shutaiteki ni kangaeru chikara wo ikusei suru daigaku e: Toushin [Toward the qualitative change of university education to build a new future: Continuing lifelong learning, To universities that nurture self-discerning ability: Reports]. (in Japanese)
- Fukuoka, Y. (2007). Social support for the psychological adaptation of new university students: Mediational effects of self-fulfilling achievement motivation. *Shizuoka Univ. Art Culture Bull.*, 8: 69-77. (in Japanese)
- Hashimoto, K. (2012). Daigaku taiiku jugyou no seika to kadai. In Hashimoto, K. et al. eds.), *Mirai wo hiraku daigaku taiiku: Jugyou kenkyu no riron to houhou* (pp.45-74). [Outcomes and issues of university physical education classes: University sports pioneering the future: Theory and methods of lesson research]. Tokyo: Fukumura Shuppan. (in Japanese)
- Honma, K., Hara, S., Kamisasa, H., Matsukawa, H., and Kitano, E. (2005). Shin tairyoku tesuto to gakkou seikatsu tekioukan: Deta sai bunseki ni yoru toukei teki inga moderu no kousei [Construction of a statistical causal model reanalyzing new physical fitness tests and school life adaptation]. *Mejiro Univ. Col. Res. Inst. Female Educ. Res. Rep.*, 17: 41-63. (in Japanese)
- Honma, K., Suginuma, K., Ito, N., Osano, A., and Hara, S. (2002). Joshi chukohsei no karada to kokoro: Shin tairyoku tesuto to gakkou seikatsu tekiou kan no chousa houkoku [Physique and fellowship among junior high and high school girls: A survey report on new physical fitness tests and feelings towards school life adaptation]. *Mejiro Univ. Col. Res. Inst. Female Educ. Res. Rep.*, 14: 77-127. (in Japanese)
- Ichimiya, A., Babazono, A., Fukumori, H., and Minematu, O. (2003). The Longitudinal change of mental state of freshman in Japanese University: The result of the past 14 years questionnaire survey. *Clin. Psychiatry*, 45: 959-966. (in Japanese)
- Isogai, H. (2005). Effect of ski training program on students' self-efficacy. *Jpn. J. Health, Phys., Educ., Recreation and Dance in Universities*, 2: 25-35. (in Japanese)
- Japan Student Services Organization (2007). Daigaku ni okeru gakusei soudan taisai no zyuuzitu housaku ni tsuite: 'Sougouteki na gakusei shien' to 'senmonteki na gakusei soudan' no 'renkei, kyoudou.' [About measures to strengthen student counseling system at university: "Cooperation and collaboration" of "comprehensive student support" and "professional student counseling"] <http://www.jasso.go.jp/gakusei/archive/icsFiles/afiedfile/2015/12/09/jyujitsuhsousaku2.pdf> (accessed 2016-02-14)
- Kiuchi, A. (2012). Kenkou zukuri to tomodachi zukuri wo okonau taiiku jugyou puroguramu [University P. E. Program for health promotion and making friends]. In K. Takenaka (ed.), *Undou to kenkou no shinrigaku* [Psychology of Exercise and Health] (pp.110-112). Tokyo: Asakura shoten. (in Japanese)
- Kyoto University (2014). Kenkou supotsu kamoku no risyuu tani suu ni tui te [Regarding the number of credits for health and sports subjects] 2014, 51st National University Liberal Education Implementing Organization Secretariat Association presentation at the National organization university liberal arts education organization conference, materials (pp. 7-49). (in Japanese)
- Lee, I. M. and Thompson, P. D. (2011). 身体活動に伴う有益性とリスク(T. Kawahara Trans.). In *American College of*

- Sports Medicine(eds.), 運動処方指針—運動負荷試験と運動プログラム—(原書第8版)(pp. 2-17). Tokyo: Nankodo. (Original work “Benefits and risks associated with physical activity” published 2009) (in Japanese)
- MEXT (2015a). Heisei 27 nendo gakkou kihon chousa (kakutei ti) no kouhyou ni tsui te. [Regarding Publication of Basic Research on School for 2015 (Final Values).] http://www.mext.go.jp/component/b_menu/other/icsFiles/afiedfile/2016/01/18/1365622_1_1.pdf(accessed 2016-02-14)
- MEXT (2015b). Monbu kagaku toukei youran. [Statistical Abstract of Education, Sci. and Culture (2015 Edition)] (pp. 104-107). (in Japanese)
- Minami, M., Asakawa, K., Akimitsu, K., and Nishimura, A. (2011). School adjustment and anticipatory anxiety about the transition from elementary school to junior high school: A school psychology study. *Jpn. J. Educ. Psychol.*, 59: 144-154. (in Japanese)
- Nakamura, S. and Matuda, E. (2013). Daigakusei no gakkou tekio ni eikyou suru youin no kentou. [Examination of the factor to influence the school adaptation of the university student: Focus on university maladaptation, university satisfaction and learning motivation.] *Bull. Edogawa Univ.*, 23: 151-160. (in Japanese)
- Nakamura, T. (2013). Syonenzi kyouiku to si te no daigaku taiiku. [University physical education as the first year education.] *The Univ. Phys. Educ. Sport*, 33: 160-164. (in Japanese)
- Nara, M. (2015). Reflections and prospects of journal for Health, Physical Education, Recreation, and Dance in Universities. *Jpn. J. for Health, Phys. Edu., Recreat., and Dance in Universities*, 12: 3-12. (in Japanese)
- Narita, H. (2014). The reconstruction of higher education based on the evidence: Pluralistic assessment of master of achievement. *J. Jpn. Soc. Inf. Knowl.*, 24: 393-403. (in Japanese)
- Nishida, J., Hashimoto, K., Kiuchi, A., Tanimoto, H., Fukuchi, T., Kamijo, T., Onizawa, Y., Nakao, H., Kiyama, K., Arai, Y., and Ogawa, M. (2015). Extraction of the perceived benefits of university physical education classes by text mining: Differences in sex and exercise habits among the categories of perceived benefits. *Jpn. J. Phys. Educ., Health, Sport Sci.*, 60: 27-39. (in Japanese)
- Nishida, J., Hashimoto, K., and Yamamoto, K. (2009). The Influence of physical education program intended to support interpersonal communication skills on subjective adjustment to school in first year university students: Using a shuttlecard “DAIFUKU”. *Jpn. J. Health, Phys. Educ., Recreat., and Dance in Universities*, 6: 43-54. (in Japanese)
- Nishiwaki, M., Kiuchi, A., and Nakamura, T. (2014a). An examination of a method for effectively increasing physical activity amount in college physical education class: A randomized intervention study. *Jpn. J. Health, Phys. Educ., Recreat., and Dance in Universities*, 11: 21-29. (in Japanese)
- Nishiwaki, M., Kiuchi, A., and Nakamura, T. (2014b). The examination of a decline in steps in the last decade and its reason: A serial cross-sectional study in male college freshmen. *Jpn. J. Phys. Fitness Sports Med.*, 63: 231-242. (in Japanese)
- Okubo, T. (2005). Factors contributing to subjective adjustment to school in adolescents. *Jpn. J. Educ. Psychol.*, 53: 307-319. (in Japanese)
- Osumi, K., Oshio, A., Ogura, M., Watanabe, K., Osaki, S., and Hiraishi, K. (2013). Study on factors affecting adjustment to university among freshmen: Focusing on factors related to whether or not it is their first choice university, their sense of confidence in university admission, and peer-oriented tendency. *The Jpn. J. adolesc. Psych.*, 24: 125-136. (in Japanese)
- Oura, T. (2012). Daigaku taiiku no hishuka ni tsuite omou koto. [Thinking about the required subject of university physical education.] *Educ. J. Health, Sport Phys. Educ.*, 13: 41-42. (in Japanese)
- Public Interest Incorporated Association, Japanese Association of University Physical Education and Sports, Survey and Research Department (2014). 2013 nendo daigaku, tanki daigaku no hoken taiiku kyouiku jittai chousa houkoku sho [Report of actual health and physical education survey of university and junior college in 2013]. (pp.1-60). (in Japanese)
- Sakaguchi, M. (2009). Mental health of the university students followed by UPI test. *Memoirs of Osaka Kyoiku Univ., Ser. III Natural Sci. Applied Sci.*, 58: 45-55. (in Japanese)
- Shimamoto, K. and Ishii, M. (2007). A study of influence on life skills of sport experience in physical education classes in college students. *Jpn. J. Sport Psych.*, 34: 1-11. (in Japanese)
- Shimamoto, K. and Ishii, M. (2010). Estimation of causal relationships between sport experience in athletic clubs and life skills acquisition. *Jpn. J. Sport Psych.*, 37: 89-99. (in Japanese)
- Shimizu, Y., Ueno, Y., Amemiya, R., Yuasa, A., Mori, A., Kato, I., and Sawaguchi, M. (2012). The effect of stress management of university physical education: Development of effective cognition scale and stress response scale for university physical education classes. *Kanagawa J. Physic. Educ. Sports Sci.*, 45: 9-15. (in Japanese)
- Shimoda, Y., Ishizu, K., and Kashimura, M. (2014). Relationship between self-evaluation of their emotions and subjective adaptation to school among junior high school students. *Jpn. J. Psychol.*, 84: 576-584. (in Japanese)
- Sugawara, K. (2000). Sinri syakudo no sakusei katei. [Contraction process of psychological scales.] In Hori, H., Yamamoto, M., and Matsui, Y. (eds.), *The file of psychological scales: Measurement of human and society* (pp.637-652). Tokyo: Horiuchi shuppan. (in Japanese)
- Sugiyama, S. (2010). Secchi kizyun taikou ka go no daigaku taiiku. [The university physical education of post siting criterion on Deregulation of University Act]. In Japan Society of Physical Education, Health and Sport Sciences (ed), *Nihon taiiku gakkai 60 shuunen kinenshi [the 60th anniversary of foundation on the Japan Society of Physical Education, Health and Sport Sciences]* (pp.217-225). (in Japanese)
- Susaki, Y., and Sugiyama, Y. (2015). Effects of adjustment to physical education classes on adjustment to school by university students: Focusing on self-regulated learning. *Jpn. J. of Phys. Educ., Health Sport Sci.*, 60: 467-478. (in Japanese)
- Tada, S. (1998). The class evaluations and the social power of the instructor in the winter outdoor activity practice. *Jpn. Outdoor Educ. J.*, 2: 21-29. (in Japanese)
- Takahira, M., Ando, R., and Sakamoto, A. (2006). Estimation of causal effects through longitudinal study: An example of internet use and aggression. *Jpn. J. Personality*, 15: 87-102. (in Japanese)
- Uchida, C. (2007). Daigaku ni okeru kyuu-taigaku, ryuunen-gakusei ni kansuru chousa (Dai 28 ho). [Research on dropout and leave of absence, and repeat of university students (28th report)]. *Rep. Univ. Ment. Health Res.*, 29: 86-108. (in Japanese)

- Uchida, C. (2014). Recent trend of drop-out and leave of absence of university students in Japan: From the epidemiological perspective. *Clin. Psychiatry*, 56: 375-384. (in Japanese)
- Wilcox, S., Ananian, C. D., Abbott, J., Vrazel, J., Ramsey, C., Sharpe, P. A., and Brady, T. (2006). Perceived exercise barriers, enablers, and benefits among exercising and nonexercising adults with arthritis: Results from a qualitative study. *Arthritis Rheumatism*, 55: 616-627.
- Yamamoto, K. and Onodera, T. (2001). Covariance structure analysis with Amos and analysis case example. Kyoto: Nakanishiya shuppan. (in Japanese)
- Yoneda, Y., Takemoto, H., Amano, Y., Yoshida, T., Goya, T., and Kito, N. (1983). Manpokei wo riyou shi ta taiiku zyugyou ni okeru tairyoku zukuri ni kansuru jissen kenkyuu: Dai 3 pou, Daigaku ippan taiiku jitugi ni okeru sousaku kyuugi, takkyu oyobi tenisu ko-su no jissenteki kenkyuu. [A practical study on physical fitness training in physical education classes using pedometer: The third report, a practical study of university general physical education practice on creative ball game, table tennis, and tennis course]. *Bull. Aichi Univ. Educ. Art, health and physical education, home economics, technology and creative arts*, 32: 53-63. (in Japanese)
- Yoshida, T., Nagasawa, H., Maruchi, Y., Takemoto, H., Amano, Y., Yoneda, Y., Goya, T., and Kito, N. (1981). Manpokei wo riyou shita taiiku zyugyou ni okeru tairyoku zukuri ni kansuru zissen kenkyuu: Dai 1 pou, Daigaku ippan taiiku jitugi ni tsuite. [A practical study on physical fitness training in physical education classes using pedometer: An initial report, about university general physical education practice]. *Bull. Aichi Univ. Educ. Art, health and physical education, home economics, technology and creative arts*, 30: 37-46. (in Japanese)
- Yoshino, H., Toyoshima, A., and Sei, T. (1986). Daigakusei no tekiou ni kansuru chouki tsuiseki teki kenkyuu: 4 nenji no tekioukan ni kakawaru 1 nenji no sanjiten no syo youin (I). [Long-term follow-up study on adjustment of university students: Factors of three time points of the first year regarding the adjustment at the time of the 4th year]. *Hirosaki Univ. Bunka Kiyou*, 24: 1-23. (in Japanese)



Name:

Junichi Nishida

Affiliation:

Faculty of Business Administration,
Kindai University

Address:

3-4-1 Kowakae, Higashi-Osaka, Osaka 577-8502

Brief Biographical History:

2017-Present Associate Professor, Faculty of Business Administration, Kindai University

2007-2017 Assistant and Associate Professor, Faculty of Education, Gunma University

2005 Received Ph.D., Human Environment Studies at Kyushu University, Major area: Sports Psychology

2004-2006 Research Associate, Faculty of Sports & Health Science, Fukuoka University

Main Works:

- Nishida, J. (2018). Influence of physical activities on mental health in elementary school teachers based on the long form Japanese version of the International Physical Activity Questionnaire (IPAQ). *Jpn. J. Phys. Educ. Health Sport Sci.*, 63: 837-851. (in Japanese with English abstract)
- Nishida, J., Hashimoto, K., Kiuchi, A., Tanimoto, H., Fukuchi, T., Kamiyo, T., Onizawa, Y., Nakao, H., Kiyama, K., Arai, Y., and Ogawa, M. (2015). Extraction of the perceived benefits of university physical education classes by text mining: Differences in sex and exercise habits among the categories of perceived benefits. *Jpn. J. Phys. Educ. Health Sport Sci.*, 60: 27-39. (in Japanese with English abstract)
- Nishida, J. and Otomo, S. (2010). Influence of exercise and physical activity on the mental health of elementary and junior high school teachers: Individual characteristics and experiences with stress. *Jpn. J. Educ. Psychol.*, 58: 285-297. (in Japanese with English abstract)

Membership in Learned Societies:

- Japan Society of Physical Education, Health and Sport Sciences
- Japanese Society of Sport Psychology
- Japanese Association of Educational Psychology
- Japanese Association of Health Psychology
- Japan Society of Stress Management
- Japan Association for the Study of Cooperation in Education
- Japanese Society of Sport Education
- International Positive Psychology Association

Appendix

◆PBS-FYPE (University Physical Education Survey)

This questionnaire contains statements on your university physical education classes. Please read each item carefully. Next to each statement, draw a circle around one of the seven numbers based on how strongly you feel about each statement by using the following scoring system:

- 1 Completely Disagree
- 2 Strongly Disagree
- 3 Somewhat Disagree
- 4 Neither Agree Nor Disagree
- 5 Somewhat Agree
- 6 Strongly Agree
- 7 Completely Agree

There are no *right* answers. It is important that you answer each question as honestly as possible. This is only for your own self-assessment.

Statements	Completely Disagree	Strongly Disagree	Somewhat Disagree	Neither Agree Nor Disagree	Somewhat Agree	Strongly Agree	Completely Agree
e.g.) I was able to go without injury during the physical education class.	1	2	3	4	5	6	7
1) I was able to make new good friends.	1	2	3	4	5	6	7
2) I was able to have enough time to move my body.	1	2	3	4	5	6	7
3) I was able to increase physical fitness level than before.	1	2	3	4	5	6	7
4) I was able to encourage my friends.	1	2	3	4	5	6	7
5) I was able to become more conscious of a regulated lifestyle.	1	2	3	4	5	6	7
6) I was able to acquire advanced motor skills.	1	2	3	4	5	6	7
7) I was able to fully understand the rules of the athletic event.	1	2	3	4	5	6	7
8) I was able to understand the importance of cooperation in a team and group.	1	2	3	4	5	6	7
9) I was able to fully relieve stress.	1	2	3	4	5	6	7
10) I was able to exercise until exhausted.	1	2	3	4	5	6	7
11) I was able to feel excitement.	1	2	3	4	5	6	7
12) I was able to maintain the level of physical fitness.	1	2	3	4	5	6	7
13) I was able to adopt a regulated lifestyle.	1	2	3	4	5	6	7
14) I was able to acquire basic motor skills.	1	2	3	4	5	6	7
15) I was able to understand effective practice methods to improve motor skills.	1	2	3	4	5	6	7
16) I was able to learn mutual help facilitates winning.	1	2	3	4	5	6	7
17) I was able to fully refresh myself from stressful feelings.	1	2	3	4	5	6	7
18) I was able to increase extracurricular exercise opportunities.	1	2	3	4	5	6	7
19) I was able to become less tired than before.	1	2	3	4	5	6	7
20) I was able to interact with various people regardless of motor skill level.	1	2	3	4	5	6	7
21) I was able to find the importance of maintaining a regulated lifestyle.	1	2	3	4	5	6	7
22) I was able to perform better using my body than before.	1	2	3	4	5	6	7
23) I was able to learn the effective ways to improve my motor skills.	1	2	3	4	5	6	7
24) I was able to feel the pleasure of playing as a team.	1	2	3	4	5	6	7
25) I was able to feel so refreshing.	1	2	3	4	5	6	7

〈Scoring Protocol〉

PBS-FYPE Sub-scale Scores

Acquisition of motor skills and training methods

F1: (6) + (7) + (14) + (15) + (22) + (23)

Understanding the importance of cooperative play and improvement of communication skills

F2: 1) + (4) + (8) + (16) + (20) + (24)

Stress coping and arousal of positive feelings

F3: 9) + (11) + (17) + (25)

Improvements in physical fitness and physical activity

F4: 2) + (3) + (10) + (12) + (18) + (19)

Establishment of regular lifestyles

F5: 5) + (13) + (21)

PBS-FYPE Total Score

Total Score

F1 + F2 + F3 + F4 + F5