

Characteristics of enjoyment of physical activity by gender and favorability of physical education classes

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Abstract:

Problem statement: The goal of Japanese physical education classes is to develop the qualities and abilities needed to become familiar with sports throughout life. Therefore, the objective is to promote health maintenance and physical fitness based on enjoyment of physical activities. There are multiple factors that contribute to the enjoyment of physical education, and these factors differ by gender and the level of liking for physical education. **Approach:** A questionnaire was administered to 144 fifth- and sixth-grade students (ages 11-12). According to the favorability of physical education, participants were divided into two groups: liking or not liking physical activities. Factor analysis was conducted for each group according to gender and favorability of physical education. **Purpose:** To clarify the factors contributing to enjoyment of physical education among students and to analyze the difference between these factors according to gender and favorability of physical education. **Results:** The factors "challenge," "competition," and "achievement" were interpreted overall. The results infer that participants enjoy physical education because of the challenge of setting goals and for being able to achieve those. In addition, a factor of "exhilaration" was interpreted. Hence, it can be inferred that they feel enjoyment from feeling better due to the physiological effects of physical activity. Among the girls, the "Spectating/discovering" factor was interpreted which meant that they found enjoyment not only in their own physical activities, but also in activities that involve thinking, such as seeing, supporting, and knowing. In addition, the "Communication" factor was interpreted by the group with low favorability of physical education, and it was found that they felt enjoyment in the context of interacting with others. **Conclusions:** The results showed that the enjoyment of physical activity differs depending on various characteristics such as gender and favorability of physical activities. This could be an important point to be considered during the development of physical education classes in future.

Key Words: enjoyment of physical activity, gender difference, physical education, factor analysis

Introduction

In Japan, school education is based on the Fundamental Law of Education, and Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT). The Courses of Study are designed in such a way that the students can receive a certain level of education regardless of the region they take classes in (MEXT, 2017). This provides more specific teaching standards in each subject area. The commentary presents the achievement goal of physical education as "to cultivate an attitude to lead a joyful and cheerful life by becoming familiar with physical activity and aiming to maintain and promote health and improve physical fitness." In other words, physical education aims to develop the qualities and abilities necessary to realize a life rich in sports. Furthermore, the goal is presented as "taste the enjoyment and pleasure of physical activity" which, based on the enjoyment of physical activity, aims to maintain and promote health and improve physical fitness (MEXT, 2017).

Enjoyment of physical activity leads to physical activity persistence (Rodrigues, F., 2019) and the ability to develop a lifelong affinity for physical activity. A positive correlation has been shown between enjoyment of physical activity and enjoyment of physical activity (Woods, C. B., 2012). Enjoyment in physical education has a greater relationship with the amount of physical activity on and off school than self-competence, and enjoyment of physical education leads to increased physical activity in Leisure time physical activity (Ghorbani, S. et al., 2020; Huhtiniemi, M. et al., 2019; Hernandez, E. H. et al., 2019) and physical activity interventions in schools increase the enjoyment of physical activity (Burns, R. D. et al., 2017). Therefore, it is important for students to enjoy physical education classes, and higher enjoyment of physical education will lead to better health maintenance. Motivation for physical activity in physical education is said to influence children's willingness to move from physical education classes to leisure time physical activity (Barkoukis, V. et al, 2011; Cox, A. E. et al, 2008). Autonomy support for leisure time physical activity from peers and parents has no effect, while teacher autonomy support in physical education classes has been shown to influence leisure time physical activity (Hagger, M. et al., 2009). Teachers supporting children in school physical education has a significant

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impact on children's enjoyment and the effectiveness of physical activity (Fin, G. et al., 2019; Sanchez-Oliva, D. et al., 2020; Hernandez, E. H. et al., 2019). Given these facts, it is important to develop classroom support and teaching methods to help students enjoy physical education, as it has a significant impact on their daily life and life-long physical activity. In considering this, it is necessary to clarify what children enjoy in physical activity.

It has been reported that there is a positive correlation between "enjoyment" and "task value," "intrinsic motivation," and "elaboration of strategies" of physical education classes (Pekrun, R. et al., 2011). In addition, Nishida, T. & Sawa, J. (1993) reported that the primary factors that defined motivation to learn in physical education were "feelings in physical education (enjoyment, happiness)," "feelings about physical activity (enjoyment, mood)," and "feelings toward success and improvement of ability (success, when one's motor ability seems to improve)." A positive correlation has been found between "enjoyment" and "perceived competence" in physical education (Carroll, B. & Loumidis, J., 2001; Cairney, J. et al., 2012; Barr-Anderson, D. J. et al., 2013), indicating that a higher sense of self-competence is associated with higher enjoyment of physical education. Conversely, a low sense of self-competence is associated with lower enjoyment of physical education and aversion to exercise (Furuta, H., 2018). In other words, being able to do it increases their sense of self-competence and enjoyment. However, the enjoyment of physical education is not limited to a sense of self-competence, but also indicates multiple factors such as cooperation with others and the atmosphere of the class (Sawa, 2017). In particular, the value of physical education class differs between boys and girls, with boys feeling enjoyment in competition and winning, and girls emphasizing peer involvement (Osugi et al., 2010; Kaji, M. & Ono, Y., 2020). Since men and women have different values regarding physical education classes, it is possible that the content of enjoyment in physical education classes also differs by gender. Furthermore, since girls showed a tendency to have reduced enjoyment in physical education as they got older (Prochaska, J.J. et al., 2003; Cairney, J. et al., 2012), it was necessary to examine factors to sustain the enjoyment they felt in younger grades.

Based on the above, it is considered that there are multiple factors that define the enjoyment of the physical activity, and it is necessary to clarify these factors to improve students' motivation to attend physical education classes. The purpose of this study is to clarify what students find enjoyment in physical activity by gender and the favorability of physical education and to highlight the factors according to various characteristics.

Material & methods

Participants

The participants were 76 boys (36 fifth-grade and 40 sixth-grade) and 68 girls (33 fifth-grade and 35 sixth-grade) from Japanese elementary schools. The purpose and method of the study was explained in writing to their homeroom teachers, and consent was obtained, before the participants were asked to cooperate.

Table 1 Questionnaire Items on Enjoyment of Physical Activity (Contents of the 37 questions)

· To perform physical activity to the point of sweating	· To discover something new through physical activity
· Competing for records and rankings	· To be praised by teachers and others
· To endure hard training	· To be able to do something you could not do before
· To laugh with others during physical activity	· To move my body with all my might
· Planning physical activity by ourselves and doing it	· Winning a game
· To experience a sense of speed	· To challenge what one cannot do
· To receive cheering from others	· To cooperate with others in physical activity
· To be able to do by myself what others cannot do	· To be able to perform physical activity freely
· To improve records and rankings	· To be able to play well
· To be able to forget about everything and get absorbed in physical activity	· To cheer for others
· To practice until you can do it again and again	· To set better records than others
· To be applauded by everyone	· To be in good physical condition
· To be able to do something you are not good at	· To do various physical activities with others
· To feel refreshed after physical activity	· To do physical activities that I am good at
· To feel a sense of victory in a game	· To have a healthy body
· To be able to finish what is painful and hard	· To forget about the things I dislike through physical activity
· To have fun with others during physical activity	· To watch others physical activity
· To perform physical activity regardless of whether you win or lose	· To be able to do various physical activities faster than others
· To make a goal and practice to achieve it	

Measure

Questionnaires were distributed to the participants and collected between October and November 2021. The collection rate was 100%. Questionnaire regarding "enjoyment" of physical activity was selected based on Tokunaga's (1980) study (Table 1). A three-point scale was used for response, where 3 was "enjoyable"; 2, "normal"; and 1, "not so enjoyable".

Participants were given as much time they needed to complete the questionnaire. If they did not understand a question, they were asked to answer it with their homeroom teacher.

Statistical analysis

SPSS software (ver. 24) was used for the analyses. Gender (male and female) and favorability of physical education were considered as various characteristics. Favorability of physical education was divided into two groups: 1) like and 2) normal or not so much. Factor analysis was conducted for the whole group and for each characteristics. Factors were calculated with an eigenvalue of 1.000 or higher using the direct varimax method and orthogonal rotation of the axes. Factors extracted from items, with coefficients having loadings of

0.4 or higher after rotation, were named. Factors with fewer than two items were considered uninterpretable. Cronbach's alpha was calculated to confirm reliability. The factors of "enjoyment" and the important factors for each characteristic were examined from the extracted factors.

Results

Overall factor analysis

The post-rotation factor matrix for the study is shown in Table 2, arranged according to the opinion with the highest factor loadings. The cumulative contribution ratio was 55.5%, with an alpha coefficient of 0.89. Factor 1 was named "Challenge" because high factor loadings were found for "To practice until you can do it again and again" (0.758), "To make a goal and practice to achieve it" (0.710), and "To endure hard training" (0.690). The variance contribution ratio was 13.0%, highest among the nine factors. Factor 2 was named "Refreshing" with high factor loadings for "To laugh with others during physical activity" (0.568), "To forget about the things I dislike through physical activity" (0.562), and "To be able to forget about everything and get absorbed in physical activity" (0.540). Factor 3 was named "Competition" with high factor loadings for "To set better records than others" (0.711), "To be able to do by myself what others cannot do" (0.660), "To be able to do various physical activities faster than

Table 2 Factor matrix after rotation - overall

The factor matrices after rotation in the overall are arranged according to the opinion with the highest factor loadings. Factors were named by synthesizing each contributing item

factor	questionnaire	1	2	3	4	5	6	7	8	9
Factor 1 Challenge	To practice until you can do it again and again	0.758	0.078	0.076	0.173	0.079	0.141	0.128	0.112	0.018
	To make a goal and practice to achieve it	0.710	0.116	0.022	0.111	0.193	0.057	0.194	0.111	0.155
	To endure hard training	0.690	0.165	0.095	0.013	-0.004	0.064	0.088	-0.071	-0.065
	To be able to finish what is painful and hard	0.686	0.177	0.069	0.191	-0.027	0.108	0.124	0.215	-0.006
	To perform physical activity to the point of sweating	0.616	0.437	0.266	-0.008	0.069	0.141	-0.143	-0.012	-0.084
	To challenge what one cannot do	0.607	0.286	0.221	0.145	0.085	-0.005	0.030	0.103	0.201
	To move my body with all my might	0.569	0.524	0.197	0.215	0.131	-0.077	-0.007	-0.020	0.187
	To discover something new through physical activity	0.549	0.194	-0.048	0.123	0.040	0.126	0.423	0.104	0.206
Factor 2 Refreshing	Planing physical activity by ourselves and doing it	0.364	0.098	-0.189	0.174	0.131	0.121	-0.055	0.145	0.201
	To laugh with others during physical activity	0.195	0.568	0.003	0.235	0.076	0.111	0.042	0.114	0.226
	To forget about the things I dislike through physical activity	0.161	0.562	0.132	0.106	0.059	0.055	0.330	0.040	0.074
	To be able to forget about everything and get absorbed in physical activity	0.295	0.540	0.179	0.032	0.034	0.133	-0.062	0.056	0.100
	To feel refreshed after physical activity	0.266	0.509	0.187	0.126	0.120	-0.006	0.163	0.249	-0.028
	To be able to perform physical activity freely	0.259	0.476	0.028	0.160	0.123	0.208	0.246	-0.029	0.090
Factor 3 Competition	To experience a sense of speed	0.308	0.421	0.229	0.285	0.189	0.021	0.054	0.074	0.124
	To have fun with others during physical activity	0.049	0.343	0.133	0.211	0.183	0.225	0.117	0.148	-0.025
	To set better records than others	0.092	0.028	0.711	0.138	0.273	0.206	0.153	0.018	-0.127
	To be able to do by myself what others cannot do	0.009	0.102	0.660	0.127	0.160	0.135	-0.106	0.121	-0.012
Factor 4 Achievement	To be able to do various physical activities faster than others	0.016	0.132	0.599	0.083	0.440	0.194	0.186	0.053	0.189
	To improve records and rankings	0.163	0.249	0.573	0.132	0.129	-0.011	-0.025	0.020	0.202
	Competing for records and rankings	0.393	0.317	0.506	0.027	0.117	-0.039	0.048	-0.026	-0.103
	To be able to do something you could not do before	0.258	0.098	0.184	0.685	0.178	-0.011	0.128	0.056	0.244
Factor 5 Approval from others	To be able to do something you are not good at	0.162	0.181	0.207	0.654	0.102	0.161	0.105	0.122	0.043
	To do various physical activities with others	0.256	0.353	0.144	0.501	0.192	0.081	0.003	0.059	0.190
	To be able to play well	0.152	0.290	0.182	0.460	0.242	0.277	0.344	-0.040	-0.147
	To cooperate with others in physical activity	0.383	0.247	-0.274	0.387	0.231	0.187	-0.038	0.346	0.037
	To be applauded by everyone	0.070	0.065	0.247	0.219	0.734	0.084	-0.007	0.046	-0.017
Factor 6 sense of victory	To receive cheering from others	0.153	0.160	0.155	0.142	0.706	0.042	-0.021	0.092	0.115
	To be praised by teachers and others	0.063	0.099	0.244	0.040	0.682	0.140	0.202	-0.076	0.103
Factor 7	Winning a game	0.285	0.114	0.260	0.090	0.159	0.766	0.081	0.032	0.155
	To feel a sense of victory in a game	0.160	0.326	0.188	0.276	0.201	0.538	0.165	-0.059	0.027
Factor 8 health	To watch others physical activity	0.240	0.156	0.013	0.142	0.053	0.062	0.505	0.273	0.086
	To cheer for others	0.328	0.224	0.007	0.171	0.165	0.135	0.362	0.173	0.077
Factor 9	To be in good physical condition	0.220	0.073	0.147	0.055	-0.018	-0.056	0.142	0.714	0.001
	To have a healthy body	-0.011	0.261	-0.011	0.392	0.124	0.135	0.160	0.437	0.225
	To perform physical activity regardless of whether you win or lose	0.090	0.129	0.007	0.122	0.077	0.049	0.104	0.029	0.567
	To do physical activities that I am good at	0.064	0.141	0.243	0.135	0.223	0.207	-0.064	0.030	0.282
	Variance Contribution Ratio (%)	13.0	8.7	7.5	6.5	6.4	3.9	3.3	3.3	2.8
	Accumulation Variance Contribution (%)	13.0	21.7	29.2	35.7	42.1	46.1	49.4	52.7	55.5

others" (0.599), and "To improve records and rankings". Factor 4 showed high factor loadings for "To be able to do something you could not do before" (0.685), "To be able to do something you are not good at" (0.654), and "Doing various physical activities with everyone" (0.501). This factor was named as "Achievement" after the ability to do what one could not do before. Factor 5 was named "Approval from others" with high factor loadings for "To be applauded by everyone" (0.734), "To receive cheering from others" (0.706), and "To be praised by teachers and others" (0.682). Factor 6 was named "Sense of victory" with high factor loadings for "Winning a game" (0.766) and "To Feel a sense of victory in a game" (0.538). Factor 8 was named "Health" with high factor

loadings for "To be in good physical condition" (0.714) and "To have a healthy body" (0.437). Factors 7 and 9 failed to interpret the common possible content. The cumulative variance of the interpretable factors was 49.4%.

Factor analysis for the boys' group

The post-rotation factor matrix for boys, arranged according to the opinion with the highest loadings for each factor, is shown in Table 3. The cumulative contribution ratio was 64.4%, with an alpha coefficient of 0.93. Factor 1 was named "Challenge" with high factor loadings for "To practice until you can do it again and again" (0.838), "To be able to finish what is painful and hard" (0.778), and "To make a goal and practice to achieve it" (0.765).

Table 3 Factor matrix after rotation - boy's group

The factor matrices after rotation in the boy's group are arranged according to the opinion with the highest factor loadings. Factors were named by synthesizing each contributing item

factor	questionnaire	1	2	3	4	5	6	7	8	9	10
Factor 1 Challenge	To practice until you can do it again and again	0.838	0.186	0.085	0.002	0.103	0.028	0.158	0.023	0.020	-0.029
	To be able to finish what is painful and hard	0.778	0.157	-0.037	-0.058	0.033	0.103	0.195	0.116	0.148	0.062
	To make a goal and practice to achieve it	0.765	0.116	0.233	-0.068	0.070	0.037	0.111	0.146	0.034	0.209
	To endure hard training	0.703	0.055	-0.071	0.035	0.169	0.036	-0.123	0.017	0.136	0.004
	To perform physical activity to the point of sweating	0.693	-0.022	0.118	0.222	0.394	0.172	-0.056	-0.028	-0.145	0.015
	To challenge what one cannot do	0.663	0.286	-0.007	0.107	0.177	0.214	0.245	0.184	-0.017	0.192
	To move my body with all my might	0.633	0.348	0.167	0.116	0.341	0.189	0.071	0.062	0.008	0.206
	To discover something new through physical activity	0.587	0.157	0.014	-0.027	0.176	0.295	0.168	0.266	0.164	0.262
	To cooperate with others in physical activity	0.486	0.330	0.347	-0.175	0.382	-0.085	0.244	0.155	0.140	0.112
	Planing physical activity by ourselves and doing it	0.485	-0.053	0.270	0.150	-0.015	0.131	0.057	0.139	0.093	-0.095
Factor 2 Achievement	To be able to perform physical activity freely	0.391	0.202	0.278	0.065	0.245	0.330	0.012	0.183	0.173	0.257
	To cheer for others	0.352	0.300	0.251	0.008	0.205	0.045	0.130	0.127	0.141	0.310
	To be able to do something you are not good at	0.162	0.764	0.057	0.172	0.148	0.041	0.100	0.120	0.058	-0.008
	To be able to do something you could not do before	0.227	0.736	0.130	0.245	0.043	0.193	0.114	0.130	0.135	0.062
Factor 3 Approval from others	To do various physical activities with others	0.195	0.523	0.284	0.257	0.271	0.278	0.075	0.082	-0.067	0.184
	To experience a sense of speed	0.278	0.413	0.188	0.096	0.375	0.143	0.102	0.124	-0.113	0.276
Factor 4 Competition	To receive cheering from others	0.170	0.054	0.815	0.113	0.128	0.053	0.087	0.109	-0.020	-0.050
	To be applauded by everyone	0.044	0.153	0.757	0.159	-0.014	0.163	0.001	-0.068	0.124	-0.018
Factor 5 Refreshing	To be praised by teachers and others	0.033	0.095	0.631	0.090	0.055	0.041	-0.163	0.254	0.043	0.327
	To be able to do by myself what others cannot do	-0.097	0.129	0.062	0.727	0.029	0.046	0.103	0.015	0.039	-0.089
	To set better records than others	0.076	0.250	0.299	0.644	-0.061	0.229	0.146	0.032	-0.071	0.037
Factor 6 sense of victory	To improve records and rankings	0.142	0.101	0.065	0.633	0.080	-0.008	-0.123	0.331	0.177	0.151
	Competing for records and rankings	0.449	0.112	0.123	0.460	0.124	-0.056	-0.048	-0.195	-0.049	0.439
Factor 7 health	To laugh with others during physical activity	0.285	0.200	0.078	0.067	0.662	0.117	-0.021	0.245	0.218	0.109
	To feel refreshed after physical activity	0.341	0.171	0.028	-0.037	0.616	0.091	0.240	-0.025	0.126	0.008
Factor 8	To be able to play well	0.179	0.410	0.264	0.120	0.180	0.608	-0.022	-0.047	0.157	0.096
	Winning a game	0.326	0.033	0.173	0.109	0.006	0.516	0.029	0.403	0.150	-0.082
	To feel a sense of victory in a game	0.267	0.272	0.169	0.045	0.154	0.438	-0.245	0.375	0.170	0.080
	To be able to do various physical activities faster than others	-0.003	0.237	0.417	0.402	-0.041	0.417	0.253	0.175	-0.128	0.181
	To forget about the things I dislike through physical activity	0.287	0.117	-0.041	0.121	0.316	0.391	0.100	0.005	0.284	0.284
Factor 9	To be able to forget about everything and get absorbed in physical activity	0.343	0.053	0.079	0.082	0.318	0.358	0.053	0.143	-0.079	-0.126
	To be in good physical condition	0.282	0.018	-0.045	0.136	0.044	-0.183	0.691	0.071	0.099	-0.056
	To have a healthy body	-0.063	0.313	0.062	0.139	0.304	0.356	0.647	0.152	0.085	-0.037
Factor 8	To watch others physical activity	0.281	0.168	0.100	-0.050	0.041	0.139	0.592	0.026	0.010	0.447
	To perform physical activity regardless of whether you win or lose	0.150	0.150	0.055	0.069	0.085	0.086	0.121	0.580	-0.072	0.017
Factor 9	To do physical activities that I am good at	0.078	0.062	0.255	0.301	0.080	0.053	0.070	0.371	0.031	0.002
	To have fun with others during physical activity	0.180	0.096	0.123	0.075	0.158	0.140	0.121	-0.018	0.834	0.010
Variance Contribution Ratio (%)		16.5	7.6	7.4	6.1	5.7	5.6	5.0	3.9	3.3	3.2
Accumulation Variance Contribution (%)		16.5	24.0	31.5	37.6	43.3	49.0	54.0	57.9	61.2	64.4

The variance contribution ratio was 16.5%, highest among the 10 factors. Factor 2 was named "Achievement" with high factor loadings for "To be able to do something I am not good at" (0.764), " To be able to do something you could not do before" (0.736), and "To do various physical activities with others" (0.523). Factor 3 was named "Approval from others" with high factor loadings for "To receive cheering from others" (0.815), "To be applauded by everyone" (0.757), and "To be praised by teachers and others" (0.631). Factor 4 was named "Competition" with high factor loadings for "To be able to do by myself what others cannot do" (0.727), "To set better records than others" (0.644), and "To improve records and rankings" (0.633). Factor 5 was named "Refreshing", with high factor loadings for "To laugh with others during physical activity" (0.662) and

"To feel refreshed after physical activity" (0.616), because it is an interpretation of the content of laughing with others, feeling refreshed, and having a change of mood. Factor 6 was named "Sense of victory" with high factor loadings for "To be able to play well" (0.608), "Winning a game" (0.516), "To feel a sense of victory in a game" (0.438), and "To be able to do various physical activities faster than others" (0.417). Factor 7 was named "Health" with high factor loadings for "To be in good physical condition" (0.691) and "To have a healthy body" (0.647). No common possible content could be interpreted for Factors 8, 9, and 10. Factors which were extracted overall were interpreted. The cumulative variance of the interpretable factors was 54.0%.

Factor analysis for the girls' group

Table 4 shows the post-rotation factor matrix for the girls' group, arranged according to the opinion with the highest loadings for each factor. The cumulative contribution ratio was 62.2%, with an alpha coefficient of 0.87. Factor 1 was named "Approval from others/Competition" with high factor loadings for "To be praised by teachers and others" and "To be able to do various physical activities faster than others" and

Table 4 Factor matrix after rotation - girl's group
The factor matrices after rotation in the girl's group are arranged according to the opinion with the highest factor loadings. Factors were named by synthesizing each contributing item

factor	questionnaire	1	2	3	4	5	6	7	8	9
Factor 1 Approval from others/ Competition	To be praised by teachers and others	0.807	0.005	0.170	0.013	0.034	0.031	0.029	0.108	0.120
	To be able to do various physical activities faster than others	0.791	0.161	0.077	-0.130	0.094	0.188	0.212	-0.132	0.026
	To be applauded by everyone	0.744	0.167	0.021	0.135	-0.033	0.063	0.057	0.192	0.089
	To set better records than others	0.651	0.128	0.104	-0.154	0.176	0.136	0.201	0.035	-0.378
	To receive cheering from others	0.632	0.193	0.064	0.114	0.007	0.134	0.018	0.158	0.220
	To be able to do by myself what others cannot do	0.528	0.252	0.063	-0.013	0.073	0.316	0.280	-0.022	-0.170
Factor 2 Challenge /Refreshing	To have fun with others during physical activity	0.496	0.136	-0.082	0.093	0.400	0.150	0.226	0.167	0.105
	To challenge what one cannot do	0.262	0.720	0.066	0.117	-0.069	0.200	-0.038	-0.074	0.027
	To move my body with all my might	0.169	0.706	0.094	0.056	0.260	0.195	0.045	0.042	0.274
	To perform physical activity to the point of sweating	0.130	0.651	0.122	0.038	0.248	0.154	0.290	0.078	-0.122
	To endure hard training	0.083	0.587	0.480	0.004	0.022	-0.027	0.023	0.172	-0.031
	To be able to finish what is painful and hard	0.099	0.549	0.315	0.148	0.086	0.172	-0.021	0.435	-0.182
Factor 3 Spectating /Discovering	To do various physical activities with others	0.136	0.528	-0.026	0.444	0.290	-0.010	0.072	0.288	0.259
	To be able to forget about everything and get absorbed in physical activity	0.039	0.482	0.031	0.037	0.467	0.450	0.118	-0.003	0.151
	Competing for records and rankings	0.293	0.456	0.068	-0.077	0.236	0.383	0.274	-0.028	-0.181
	To discover something new through physical activity	0.082	0.214	0.691	0.153	0.055	-0.043	-0.136	0.110	0.098
	To cheer for others	0.086	-0.002	0.681	0.224	0.225	0.129	0.144	-0.139	-0.021
	To watch others physical activity	0.051	-0.044	0.587	-0.039	0.370	0.024	0.190	0.108	0.101
Factor 4 Creation	To make a goal and practice to achieve it	0.132	0.297	0.566	0.131	-0.164	0.332	0.063	0.195	0.168
	To practice again and again until I can do it again and again	0.112	0.346	0.500	0.082	-0.020	0.115	0.215	0.395	-0.022
	To cooperate with others in physical activity	0.009	0.131	0.042	0.791	0.012	-0.084	0.164	0.150	-0.076
Factor 5 Liberation	To have a healthy body	0.170	-0.103	0.168	0.765	0.114	0.257	-0.085	0.146	0.161
	Planning physical activity by ourselves and doing it	-0.187	0.179	0.262	0.692	-0.063	0.024	0.058	-0.078	0.213
Factor 6 Satisfaction	To be able to perform physical activity freely	-0.012	0.192	0.150	-0.003	0.672	0.064	0.112	0.018	0.048
	To forget about the things I dislike through physical activity	0.237	0.124	0.197	0.094	0.469	0.274	-0.034	0.007	0.211
	To improve records and rankings	0.403	0.337	0.000	-0.087	0.056	0.596	0.058	0.157	0.062
	To laugh with others during physical activity	0.137	0.160	0.092	0.184	0.281	0.506	0.119	0.084	0.370
Factor 7 Confidence	To experience a sense of speed	0.260	0.336	0.141	0.269	0.141	0.464	0.124	0.066	0.070
	To feel refreshed after physical activity	0.351	0.223	0.244	-0.035	0.323	0.424	-0.012	0.178	0.062
	To be in good physical condition	0.181	0.125	0.280	0.171	0.150	0.294	-0.206	0.187	-0.097
	Winning a game	0.428	0.193	0.267	0.153	0.121	0.002	0.633	0.122	-0.162
Factor 8 Achievement	To do physical activities that I am good at	0.261	0.115	-0.020	0.066	0.095	0.075	0.484	0.109	0.235
	To feel a sense of victory in a game	0.426	-0.015	0.202	0.332	0.344	0.196	0.427	0.108	-0.109
	To be able to do something you are not good at	0.302	0.073	0.149	0.237	0.262	0.127	0.405	0.558	0.093
Factor 9	To be able to do something you could not do before	0.280	0.171	0.222	0.229	-0.123	0.184	0.108	0.484	0.324
	To be able to play well	0.379	-0.030	0.320	0.180	0.357	0.119	0.097	0.414	-0.186
	To perform physical activity regardless of whether you win or lose	0.068	0.007	0.084	0.086	0.122	0.073	0.024	0.010	0.589
	Variance Contribution Ratio (%)	12.8	10.2	7.8	6.9	6.0	5.9	4.5	4.3	3.8
	Accumulation Variance Contribution (%)	12.8	23.0	30.8	37.7	43.7	49.6	54.1	58.4	62.2

others" (0.807), "To be able to do various physical activities faster than others" (0.791), "To be applauded by everyone" (0.744), and "To set better records than others" (0.651). The variance contribution ratio was 12.8%, highest among nine factors. Factor 2 was named "Challenge/Refreshing" with high factor loadings for "To challenge what you cannot do" (0.720), "To move your body with all you might" (0.706), and "To perform physical activity to the point of sweating" (0.651). Factor 3 was named "Spectating and discovering" with high factor loadings for "To discover something new through physical activity" (0.691), "To cheer for others" (0.681), and "To watch others' physical activity" (0.587). Factor 4 was named "Creation" with high factor loadings for "To cooperate with others in physical activity" (0.791), "To have a healthy body" (0.765), and "Planning

physical activity by ourselves and doing it" (0.692). The term "Creation" was used because it was interpreted as the content of creating and performing physical activities in cooperation with others. Factor 5 was named "Liberation" with high factor loadings for "To be able to perform physical activity freely" (0.672) and "To forget about the things I dislike through physical activity" (0.469). The factor was interpreted as the mind being liberated by physical activities. Factor 6 was named "Satisfaction" with high factor loadings for "To improve records and rankings" (0.596) and "To laugh with others during physical activity" (0.506). This factor was fulfilled through improved records and involvement with others. Factor 7 was named "Confidence" with high factor loadings for "Winning a game" (0.633), "To do physical activity you are good at" (0.484), "To feel a sense of victory in a game" (0.427), and "To be able to do something you are not good at" (0.405). Factor 8 was named "Achievement" with high factor loadings for "To be able to do something you could not do before" (0.484) and "To be able to play well" (0.414). No common possible content could be interpreted for Factor 9. The cumulative variance of the interpretable factors was 58.4%.

Factor analysis for the favorability characteristic – "like"

Table 5 shows the post-rotation factor matrix for the "I like physical education" group, arranged according to the

Table 5 Factor matrix after rotation for favorability - "like"

The factor matrices after rotation in the "like" are arranged according to the opinion with the highest factor loadings. Factors were named by synthesizing each contributing item

factor	questionnaire	1	2	3	4	5	6	7	8	9	10	11	12
Factor 1 Challenge	To practice until you can do it again and again	0.647	-0.003	0.063	0.167	0.080	0.091	0.014	0.079	0.031	-0.018	-0.007	0.024
	To make a goal and practice to achieve it	0.643	0.041	0.126	0.068	0.107	0.170	-0.097	0.085	0.092	-0.162	0.066	0.133
	To endure hard training	0.636	0.101	0.024	-0.053	-0.195	-0.001	-0.029	0.070	0.057	0.149	0.030	-0.013
	To be able to finish what is painful and hard	0.630	0.099	-0.065	0.150	0.208	0.088	0.060	0.071	0.030	0.009	-0.075	-0.092
	To move my body with all my might	0.507	0.336	0.055	0.244	0.061	-0.156	0.252	0.147	-0.080	0.247	0.284	0.014
	To perform physical activity to the point of sweating	0.496	0.327	0.126	-0.161	-0.176	0.107	0.174	0.066	0.183	0.137	0.179	0.146
Factor 2 Competition	To challenge what one cannot do	0.495	0.331	-0.009	0.235	0.222	0.094	0.122	0.063	-0.057	0.225	0.038	0.265
	To discover something new through physical activity	0.443	0.001	0.068	0.210	0.200	0.265	0.068	0.147	0.008	0.283	-0.105	0.185
	To improve records and rankings	0.179	0.740	0.047	0.055	-0.129	0.013	0.115	0.043	0.102	-0.036	0.073	-0.005
	Competing for records and rankings	0.148	0.734	0.030	0.008	-0.081	-0.017	-0.068	0.204	-0.067	0.077	0.109	-0.058
Factor 3 Approval from others	To be able to do by oneself what others cannot do	-0.061	0.656	0.104	0.197	0.140	0.158	0.152	-0.105	0.046	-0.026	-0.072	0.089
	To set better records than others	0.155	0.620	0.226	0.055	0.150	0.238	-0.079	-0.058	-0.042	0.163	-0.023	0.029
	To be able to do various physical activities faster than others	-0.032	0.552	0.374	-0.016	0.266	0.282	-0.079	0.066	-0.225	0.106	0.103	0.202
Factor 4 Achievement	To be praised by teachers and others	0.014	0.153	0.841	0.062	0.015	0.089	-0.032	0.050	-0.090	-0.028	0.061	0.066
	To be applauded by everyone	-0.006	0.085	0.813	0.128	-0.016	0.111	0.081	0.080	0.094	0.155	-0.048	-0.010
	To receive cheering from others	0.154	0.105	0.746	-0.051	0.068	-0.058	0.040	0.065	0.118	-0.069	0.047	-0.015
Factor 5 health	To be able to do something you are not good at	0.197	0.070	0.058	0.817	0.141	0.038	0.067	0.052	0.011	-0.065	0.044	0.024
	To be able to do something you could not do before	0.166	0.164	0.046	0.807	0.124	0.007	0.081	0.248	0.114	0.181	0.027	0.122
	To do various physical activities with others	0.145	0.296	0.154	0.439	0.296	-0.048	-0.094	0.195	0.120	0.316	0.285	-0.058
Factor 6 Sense of	To have a healthy body	-0.056	-0.037	0.025	0.238	0.639	0.095	0.276	-0.031	0.118	0.121	0.088	-0.007
	To be in good physical condition	0.395	0.065	-0.016	0.073	0.602	-0.187	0.105	0.010	0.093	-0.086	-0.222	0.005
	To watch others physical activity	0.072	0.077	0.052	0.073	0.504	0.111	-0.147	0.263	0.036	0.042	0.152	0.107
Factor 7 Liberation	To cooperate with others in physical activity	0.224	-0.189	0.253	0.314	0.404	0.079	0.031	0.295	0.320	-0.370	0.126	-0.133
	To feel a sense of victory in a game	0.203	0.131	0.125	0.140	-0.097	0.715	0.083	0.171	0.178	0.091	0.176	-0.120
Factor 8 Confidence	Winning a game	0.192	0.270	0.039	-0.113	0.157	0.692	0.054	0.099	-0.050	0.060	-0.185	0.084
	To laugh with others during physical activity	-0.140	0.023	0.010	0.189	0.030	0.034	0.677	0.049	0.193	0.005	0.003	-0.032
	To be able to forget about everything and get absorbed in physical activity	0.317	0.124	0.046	-0.197	0.073	0.223	0.608	-0.173	-0.005	0.100	0.066	0.235
Factor 9 Free	To feel refreshed after physical activity	0.266	-0.008	0.093	0.023	0.114	-0.165	0.386	0.236	-0.063	0.090	0.015	-0.166
	To cheer for others	0.196	0.038	0.183	0.157	0.158	0.003	-0.009	0.596	-0.018	-0.003	0.046	0.110
Factor 10 Free	To be able to perform physical activity freely	0.138	0.065	0.008	0.111	0.000	0.266	0.062	0.546	0.071	0.195	0.000	0.016
	Planning physical activity by ourselves and doing it	0.165	-0.017	0.086	0.099	0.185	0.081	0.178	0.049	0.812	0.109	-0.048	0.124
Factor 11 Free	To be able to play well	0.153	0.074	0.308	0.236	0.119	0.340	-0.157	0.064	0.240	0.515	0.102	-0.296
	To forget about the things I dislike through physical activity	0.098	0.112	-0.011	0.034	0.025	0.099	0.275	0.195	0.068	0.431	0.006	0.001
Factor 12 Free	To experience a sense of speed	0.070	0.287	0.145	0.266	0.198	0.098	0.187	0.173	0.054	0.014	0.620	-0.003
	To have fun with others during physical activity	0.040	0.104	0.099	0.125	0.086	0.185	0.136	0.390	0.267	0.007	-0.496	-0.220
Factor 12 Free	To perform physical activity regardless of whether you win or lose	0.092	0.001	-0.011	0.056	0.062	-0.001	-0.028	0.008	0.067	-0.047	0.061	0.570
	To do physical activities that I am good at	-0.001	0.285	0.283	0.038	-0.102	-0.042	0.111	0.250	-0.020	0.099	-0.095	0.420
Variance Contribution Ratio (%)		9.2	8.3	6.9	6.2	5.0	4.7	4.1	4.0	3.2	3.2	2.9	2.8
Accumulation Variance Contribution (%)		9.2	17.5	24.3	30.5	35.6	40.2	44.3	48.3	51.5	54.7	57.6	60.4

opinion with the highest loadings for each factor. The cumulative contribution ratio was 60.4%, and the alpha coefficient was 0.83. Factor 1 was named "Challenge" with high factor loadings for "To practice until you can do it again and again" (0.647), "To make goal and practice toward them" (0.643), and "To endure hard training" (0.636). The variance contribution ratio was 9.2%, highest among the eight factors. Factor 2 was named "Competition" with high factor loadings for "To improve records and rankings" (0.740), "Competing for records and rankings" (0.734), and "To be able to do by myself what others cannot do" (0.656). Factor 3 was named "Approval from others" with high factor loadings for "To be applauded by everyone" (0.841), "To be applauded by everyone" (0.813), and "To receive cheering from others" (0.746). Factor 4 was named "Achievement" with high factor loadings for "To be able to do something you are not good at" (0.817), "To be able to do something you could not do before" (0.807), and "To do various physical activities with others" (0.439). Factor 5 was

named "Health" with high factor loadings for "To have a healthy body" (0.639) and "To watch others' physical activity" (0.602). Factor 6 was named "Sense of victory" with high factor loadings for "To feel a sense of victory in a game" (0.715) and "Winning a game" (0.692). Factor 7 was named "Liberation" with high factor loadings for "To laugh with others during physical activity" (0.677) and "To be able to forget about everything and get absorbed in physical activity" (0.608). Factor 12 was named "Free" as it allows the participants to perform physical activities freely since high factor loadings were found for "To perform physical activity regardless of whether you win or lose" (0.570) and "To do physical activities that you are good at" (0.420). Factors 8, 9, 10, and 11 could not be interpreted for common content. The cumulative variance contribution of the interpretable factor was 47.1%.

Factor analysis for the favorability characteristic – “not like”

Table 6 shows the post-rotation factor matrix for the group not liking physical education normally or at all, arranged by opinion with the highest loadings for each factor. The cumulative contribution ratio was 63.7%, and the alpha coefficient was 0.87. Factor 1 was named "Confidence" with high factor loadings for "To set better records than others" (0.821), "To be able to do various physical activities faster than others" (0.765), and "To be applauded by everyone" (0.726). The variance contribution ratio was 13.6%, highest among the six factors.

Table 6 Factor matrix after rotation for favorability - "not like"

The factor matrices after rotation in the "not like" are arranged according to the opinion with the highest factor loadings. Factors were named by synthesizing each contributing item

factor	questionnaire	1	2	3	4	5	6	7	8
Factor 1 Confidence	To set better records than others	0.821	0.015	0.162	-0.137	0.096	0.099	-0.179	0.000
	To be able to do various physical activities faster than others	0.765	-0.004	0.274	0.183	0.108	0.122	0.079	0.055
	To be applauded by everyone	0.726	0.161	0.168	0.125	-0.058	0.042	0.151	0.105
	To be able to do by myself what others cannot do	0.670	0.030	0.081	-0.049	-0.096	0.171	-0.197	0.119
	To be praised by teachers and others	0.638	0.018	0.085	0.218	0.266	-0.025	0.062	-0.273
	To receive cheering from others	0.616	0.083	0.251	0.281	0.022	0.102	0.380	0.078
	To improve records and rankings	0.546	0.148	0.114	0.321	0.056	0.120	0.013	0.277
Factor 2 Challenge	To be able to do something you could not do before	0.398	0.288	0.382	0.275	0.076	-0.029	0.252	0.176
	To practice until you can do it again and again	0.161	0.849	0.214	-0.013	0.190	0.114	0.106	0.013
	To be able to finish what is painful and hard	0.073	0.770	0.186	0.126	0.271	0.239	0.040	0.104
	To make a goal and practice to achieve it	0.171	0.694	0.039	0.221	0.294	-0.026	0.285	0.134
	To endure hard training	0.007	0.678	0.055	0.070	0.197	0.096	-0.037	0.042
	To challenge what one cannot do	0.167	0.672	0.001	0.331	0.001	0.280	0.128	0.075
	To perform physical activity to the point of sweating	0.115	0.578	0.243	-0.031	-0.059	0.547	-0.143	0.094
Factor 3 Achievement	To experience a sense of speed	0.298	0.299	0.226	0.267	0.099	0.251	0.106	0.225
	Winning a game	0.397	0.325	0.627	0.033	0.169	0.017	0.003	-0.282
	To be able to do something you are not good at	0.347	0.120	0.591	0.175	0.234	0.127	-0.113	0.111
	To do physical activities that I am good at	0.249	0.069	0.565	0.078	0.002	0.122	0.123	0.090
	To do various physical activities with others	0.140	0.146	0.547	0.434	-0.024	0.268	0.172	0.046
	To feel a sense of victory in a game	0.402	0.049	0.521	0.190	0.328	0.131	-0.013	-0.102
	To have a healthy body	0.183	0.012	0.469	0.351	0.312	0.067	0.329	0.341
Factor 4 Communication	To cooperate with others in physical activity	-0.124	0.427	0.465	0.302	0.085	0.159	0.121	0.089
	To be able to play well	0.387	0.125	0.462	0.155	0.407	0.183	-0.102	0.111
	To laugh with others during physical activity	0.098	0.340	0.236	0.707	0.169	0.122	-0.157	0.113
	To perform physical activity regardless of whether you win or lose	0.142	0.073	0.198	0.639	0.180	0.007	0.214	-0.021
	To have fun with others during physical activity	0.444	0.170	0.206	0.467	0.162	0.325	-0.249	0.000
	To be able to perform physical activity freely	0.129	0.159	0.190	0.369	0.326	0.367	0.081	-0.124
	Factor 5 Spectating	To watch others physical activity	-0.003	0.328	0.077	0.114	0.777	0.136	-0.051
To cheer for others		0.095	0.251	0.217	0.083	0.611	0.052	0.126	0.150
To discover something new through physical activity		-0.069	0.516	0.050	0.252	0.558	-0.008	0.168	0.009
Factor 6 Liberation	To forget about the things I dislike through physical activity	0.211	0.164	0.100	0.411	0.452	0.386	-0.008	0.104
	To be able to forget about everything and get absorbed in physical activity	0.093	0.128	0.275	0.162	0.124	0.627	0.054	0.084
	To move my body with all my might	0.178	0.472	0.132	0.391	0.086	0.568	0.234	-0.042
	Competing for records and rankings	0.384	0.324	-0.061	-0.107	0.133	0.515	0.016	0.132
Factor 7	To feel refreshed after physical activity	0.340	0.254	0.138	0.278	0.302	0.354	-0.135	0.348
	Planing physical activity by ourselves and doing it	-0.112	0.442	0.156	0.044	0.081	0.089	0.703	-0.105
Factor 8	To be in good physical condition	0.130	0.175	0.064	0.019	0.263	0.095	-0.047	0.512
Variance Contribution Ratio (%)		13.6	13.2	8.7	7.9	7.3	6.3	3.8	2.9
Accumulation Variance Contribution (%)		13.6	26.8	35.5	43.4	50.7	57.0	60.8	63.7

2 was named "Challenge" with high factor loadings for "To practice until you can do it again and again" (0.849), "To be able to finish what is painful and hard" (0.770), and "To make goals and practice to achieve it" (0.694). Factor 3 was named "Achievement" with high factor loadings for "Winning a game" (0.627) and "To be able to do something you are not good at" (0.591) because, winning a match and overcoming something one is not good at are interpreted as the content toward becoming able to perform those activities. Factor 4 was named "Communication" with high factor loadings for "To laugh with others during physical activity" (0.707), "To perform physical activity regardless of whether you win or lose" (0.639), and "To have fun with others during physical activity" (0.467). It is interpreted as the content of feeling of enjoyment by engaging in the physical activities while interacting with others. Factor 5 was named "Spectating" with high factor loadings for "To watch others' physical activity" (0.777) and "To cheer for others" (0.611). Factor 6 was named "Liberation" with high

factor loadings for "To be able to forget about everything and get absorbed in physical activity" (0.627) and "To move my body with all my might" (0.568). Factors 7 and 8 could not be interpreted for common content. The cumulative variance contribution of the interpretable factors was 57.0%.

Discussion

Moore, J. B. et al. (2009) presents "task goal orientation," a goal-driven approach to tasks, as a factor in enjoyment of physical activity. In this study as well, challenge, competition, and achievement were interpreted in the overall analysis, and it could be inferred that children felt enjoyment in setting goals in physical activity, challenging themselves, and being able to perform activities. When considering physical education classes, it is necessary to include content related to challenge, competition, and achievement to improve enjoyment. "Sense of victory" was also included as a factor of enjoyment. It can be inferred that students also feel enjoyment in winning through challenge and competition. Tokunaga et al. (1992) reported changes in the feeling of exhilaration, and lactate, which indicates fatigue, and beta-endorphin secretion before and after physical activity. There is a negative correlation between feeling refreshed and lactate secretion, and a positive correlation between feeling refreshed and the secretion of the feel-good hormone beta-endorphin. The interpretation of "Refreshing" suggests that the students enjoy the ability to feel better and refreshed more than the physiological benefits of physical activity. "Approval from others" has been reported in previous studies as the enjoyment for being recognized by others (Kaji, M. & Ono, Y., 2020; Sawa, S., 2017). Similar results were found in this study as well. From the fact that "Health" factor was interpreted, it can be inferred that children perceive the importance of physical activity to improve health. In Japan, physical education is presented as two separate units, practical and theoretical skills for health. In the MEXT (2017), in the commentary on physical education, it is mentioned that practical and theory classes should be connected more and research regarding this is underway (Sato, Y., 2017). Deci, E. L. & Ryan, R. M. (2002) indicate three basic psychological needs of human beings: autonomy, competence, and relationships. Since the "Health" factor is related to these desires, it is necessary to create physical education classes with this content as part of the related education.

Regarding the gender difference, factors, such as "Spectating and discovering" and "Creation" were interpreted only by girls. In other words, girls also perceive the enjoyment of physical activity in terms of seeing, supporting, and knowing expressed through spectating, cheering, and making discoveries. The enjoyment of physical education declines with age for girls. Cairney et al. (2012) reported that the factor that contributed to the enjoyment of physical education in middle school-aged girls was the enjoyment of the exercise itself (Ghorbani, S. et al., 2020). Therefore, to ensure that the enjoyment of physical education is not reduced among girls, it is important to take an approach for the classes from the aspect of seeing, supporting, and knowing the physical activity, and to link this with enjoyment. The current MEXT (2017) also include the study of various ways of interacting with physical activity, such as "doing, seeing, supporting, and knowing" (MEXT, 2017), which indicate the necessity of using a physical education perspective/thinking. As indicated by this study, these are very important perspectives in the creation of physical education classes because they help enhance the enjoyment of physical education and acquire the qualities and abilities to become familiar with sports throughout life.

Regarding favorability of physical education, "Communication" and "Spectating" could be interpreted as factors only in the group with low favorability of physical education. This means that they enjoy doing physical activity with others and watching others' physical activity. Therefore, it is important to include various ways of involvement, such as watching games, in physical education so that children with low favorability can also enjoy. It also encourages children to communicate with each other.

As these results show, enjoyment factors for physical education differ according to gender and favorability. The identification of the characteristics of enjoyment by gender and favorability for physical education may be important for future development of physical education classes. Since there is a relationship between self-competence and enjoyment of physical education (Cairney, J. et al., 2012), and the factors of "Challenge", "Competition", and "Achievement" have high contribution rates. It is necessary to devise and take steps to enable them in physical education classes. However, it is also necessary to incorporate various ways to interact with physical activities from different perspectives, such as "doing, seeing, supporting, and knowing", during classes, so that students can experience the "enjoyment" from various aspects.

Conclusion

It has been shown that making physical education classes enjoyable can lead to a lifelong interest in physical activity among children. In order to make physical education enjoyable, we examined what students with different characteristics find enjoyable in physical activity. In this study, the factors of enjoyment of physical activity were examined in 5th and 6th graders according to sex and favorability of physical education, and each showed different characteristics. Among girls, the factors of spectating and discovering were indicated. In the group with low favorability of physical education, the factor of communication was indicated. These findings are very important in school physical education, where a wide variety of students are involved together. Based on the results of this study, teachers need to consider physical education classes based on the fact that physical activity can be enjoyed in a variety of ways. The study of physical education in Japan is divided into

domains based on motor skills. Senda, T (1989) indicated the enjoyment was felt by children in each domain, focusing mainly on the motor characteristics. Since the factors of "enjoyment" differ by domains, it is necessary in future to examine children's characteristics and motor domains simultaneously, and to indicate in more detail the "enjoyment" felt by children.

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