

The Structure of a Causal Relationship among People's Actual Feelings on "Physical Fitness" of Children

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The purpose of this study was to elucidate the feelings of the general public regarding the "physical fitness" (PF) of children, and the cause and effect relationship. This study was conducted using a questionnaire between February and March 2004. The sample of analysis comprised 1,393 adult males and females. The questionnaire consisted of 6 items on basic attributes, and 25 items on the status of specific physical fitness and motor ability elements of children today compared to children in the past. The proportion of subjects having actual feeling that modern children have lower PF level compared to children of the past were 46.6-76.6% for the item "Image of PF for Protection", 45.0-73.0% for "Image of PF for Performance", 27.7-50.8% for "Image of Motor Ability", and 35.5-66.1% for "Image of Mental Factor". The results showed a tendency toward a high score for "Image of PF for Protection". On the other hand, the cause and effect relationship among actual feelings on "PF" of children was also clarified. According to the analysis, the path coefficients from each PF/MA element to "Image of General PF" were 0.54 for "Image of PF for Protection", 0.26 for "Image of PF for Performance", 0.15 for "Image of Motor Ability", and 0.02 for "Image of Mental Factor". The results thus showed that the "Image of PF for Protection" had the strongest influence. The above findings suggest that practice of focusing on training "PF for protection" is necessary to eliminate feelings of the general public regarding the "decline of PF" in children.

Keywords: general physical fitness image, physical fitness for protection, physical fitness for performance, motor ability, mental factor

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1. Introduction

Physical fitness (PF) of children has been actively discussed in recent years. The Ministry of Education, Culture, Sports, Science and Technology (MEXT) has been developing measures focusing on improvement of PF of children since 2003 in response to an inquiry by the Central Council for Education on "Comprehensive Measures to Improve the Physical Fitness of Children" (September, 2002) (Hibino, 2004).

Meanwhile, since its revision in early 1970's, the Government Guideline for Teaching in Japan has been consistently using the expression "improvement of PF" both in the objectives of Physical Education/Health and Physical Education and in a newly added Section 3: Physical Education of Chapter 1: General Rules. This means that we have

been trying to improve PF of children for more than thirty years through total activities of Japanese school education. Part of the achievements in practice of "PF promotion" can be verified from results of the PF & motor ability (MA) test, which has been annually carried out and controlled by MEXT since 1964.

Data of the PF/MA test have received international recognition. The data permitted extensive examination of the change in Japanese children's PF and MA (Nishijima, et al., 2001, 2003; Noi and Masaki, 2002). The findings from the total scores of the PF/MA test in reports have demonstrated: 1) general PF/MA of Japanese children tended to improve from the start of the survey to around early 1970's; 2) it showed marginal changes from the early 1970's to around 1985 to 1990; 3) after that, it was shifting down until 1997 when the survey items were changed; 4) from 1998 to the present, as observed

from the result of the New Sport Test, the change is marginal in elementary school and has an increasing tendency in junior and senior high school (Noi and Suzuki, 2006). Now that evidence-based health promotion is emphasized (Tilford, 2000), data-based discussion on PF/MA change of children is thus an advantage in our country.

Regardless of such change, the issue of children's PF has been a public concern over the years at any time the fitness level is high or low.

For instance, in 1961, to inquire on "Content and implementation method of sport tests" for the Council for Health and Physical Education, then MEXT Minister Araki explained children's PF image by noting that "Recent adolescents' physique has grown remarkably but their basic motor ability has not improved enough." As mentioned above, children's PF/MA was admittedly low in 1964 when the PF/MA test began. Accordingly, it was quite natural for the public to have concerns about children's PF at around the same period of 1961. However, in 1972 when the children's PF/MA marked its peak level, the Council for Health and Physical Education described PF image in a report that "As for the students' health issue, their physical fitness does not tend to accompany their physical improvement." A similar 1997 report mentioned that "Despite students' physical improvement, physical fitness and motor ability have a declining tendency conversely and ... (abbreviated)" (Council for Health and Physical Education, 1997). And a 2003 report also said that "Seriousness in declining fitness of students has been corroborated by lowering physical fitness and motor ability despite their physical improvement" (Report by the Central Council for Education, 2003). This means that the PF image presented by the government and the advisory organization has not been changed for more than 40 years.

Such PF image is not limited to the government and its advisory organization. "Declining PF" of children was a general concern of the public and was actually felt greater than we can imagine. It is reported that in the fields of nursery and education, teachers actually feel the physical change of children through routine contact with them (Abe, et al., 2006). In this sense, we cannot flatly ignore the concern only because the actual general feelings of "declining PF" of children by the public do not correspond to the result of the PF and MA test. Under the notion that one mission of education is to respond to

social anticipation, careful analysis and creation of practice may be urgently needed tasks for the field of education in order to eliminate the concern of actual feelings of children's "declining PF," which has lasted for years.

Careful analysis of actual feelings is thus prerequisite to materialize the practice for eliminating persistent public worries of "declining PF" of children. Without such work, tackling the problem only with images will not eliminate the public feelings of "declining PF" of children.

The purpose of this study was to elucidate substance of actual feelings of the public toward children's PF and its causal relationship structure.

2. Methods

2.1. Definition of physical fitness and motor ability

PF elements and the relationship between PF and MA used in the present study are defined in the following way.

Conventionally, the meaning of PF slightly differs according to the people who use the term (Ikai, 1979). Many researchers have presented the definition from old times (Miyashita, 1995). The present study, referring to these previously-presented definitions (Fukuda and Nagashima, 1949; Matsuoka, 1951; Ikai, 1961), defines it as "physical and mental ability on the basis of human life or existence". In addition, I consider it appropriate to use a general and simple definition which includes not only "physical factors" but "mental factors" for examination of children's PF actually felt by the public.

First, for classifying PF factors, the following view by Matsuoka (1951) was referred to in this study. His perception is that PF is physical factors of materialized performance (or perhaps execution) and that PF is considered to be a substantial conception while MA is a phenomenal conception. Execution (phenomenon) obtained by working on the external world is a reflection of "physical quality" (substance). Following many former researches, "physical factors" were classified as "PF for Protection", which can be estimated from the maintenance ability of physical function to induction by the external world, and "PF for Performance", which was estimated from execution of induction to the external world, in the present study.

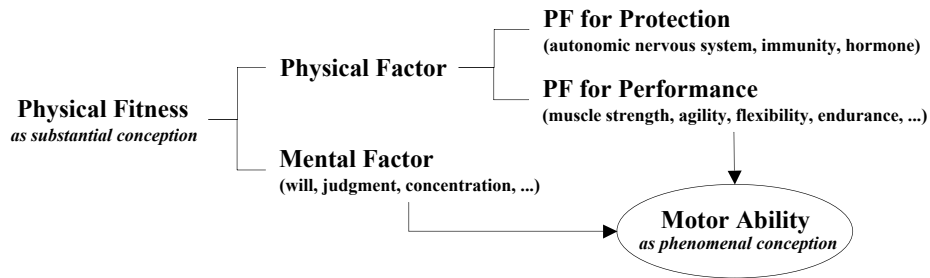


Figure 1 Classification of “Physical Fitness” elements and relationship between “Physical Fitness” and “Motor Ability”

Table 1 Attributes of the subjects (n=1,393)

What is your sexuality? :	
• Male	181 (13.0%)
• Female	1,211 (87.0%)
• Undetermined	1 (0.1%)
How old are you? :	
• 20's	24 (1.7%)
• 30's	449 (32.3%)
• 40's	795 (57.2%)
• 50's	97 (7.0%)
• 60's	10 (0.7%)
• 70's	7 (0.5%)
• Other	8 (0.6%)
• Undetermined	3 (0.2%)
What relation are you and a child in your family? :	
• Grandfather	4 (0.3%)
• Grandmother	10 (0.7%)
• Father	167 (12.0%)
• Mother	1,161 (83.4%)
• Uncle	3 (0.2%)
• Aunt	7 (0.5%)
• Other	15 (1.0%)
• Undetermined	26 (1.9%)
Is your work connected with a child? :	
• No	1,126 (80.9%)
• Yes	266 (19.1%)
• Undetermined	1 (0.1%)
(Details of “Yes”)	
- Besides a teacher	98 (36.8%)
- Teacher	152 (57.1%)
/ Nursery school, Kindergarten	27 (17.8%)
/ Elementary school	84 (55.3%)
/ Junior high school	29 (19.1%)
/ High school	10 (6.6%)
/ University, College	2 (1.3%)
- Undetermined	16 (6.0%)

Accounting for the above descriptions, PF elements and the relationship between PF and MA used in the present study were defined as shown in **Figure 1**.

2.2. Subjects and Research Period

Subjects of the present study were families and teachers of children from seven elementary schools and four junior high schools in Tokyo, Kanagawa, Saitama, Kyoto, Osaka, and Hyogo with a total of 2,237 adult males and females. Among data collected from 1,532 subjects (68.5%), we used 1,393 subjects' data (62.3%) which did not hold any missing values to the question items about actual feelings toward children's PF and MA. The survey was conducted from February to March in 2004.

Table 2 The “children” whom the subjects imagined (n=1,393)

What age phase was the children whom you imagined? :	
(Several answers are possible)	
• Infants (0-1 years old)	91 (6.5%)
• Children (1-5 years old)	342 (24.6%)
• Elementary school students (6-11 years old)	1,218 (87.6%)
• Junior high school students (12-14 years old)	775 (55.8%)
• High school students	298 (21.4%)
• Other	18 (1.3%)
Which generation was the ex-children whom you imagined? :	
(Several answers are possible)	
• 1940's	137 (9.9%)
• 1950's	290 (20.9%)
• 1960's	829 (59.7%)
• 1970's	636 (45.8%)
• 1980's	161 (11.6%)
• 1990's	45 (3.2%)
• Other	12 (0.9%)

2.3. Survey Method

The survey applied the blank questionnaire method. The form consisted of six question items asking six basic attributes (sex, age, occupation, relationship, children's present age phase imagined, children's living time in the past imagined) and 25 items asking actual feelings about PF/MA elements by comparing children today with those in the past.

Specific question items in the basic attributes are shown in **Table 1** and **2**. The question items relating to the status of PF/MA elements comprised five items for each "Image of PF for Protection", "Image of PF for Performance", "Image of MA", "Image of Mental Factor", and "Image of general PF" in accordance with the classification of PF factors shown in **Figure 1**. "Image of General PF" vaguely asked the status of PF. The specific question items are shown in **Figure 3**.

The question form was distributed and collected by teachers of the participant schools through children of the relevant schools.

2.4. Hypothesized Model

The aforementioned PF elements were classified into "Physical Factor" and "Mental Factor"; the

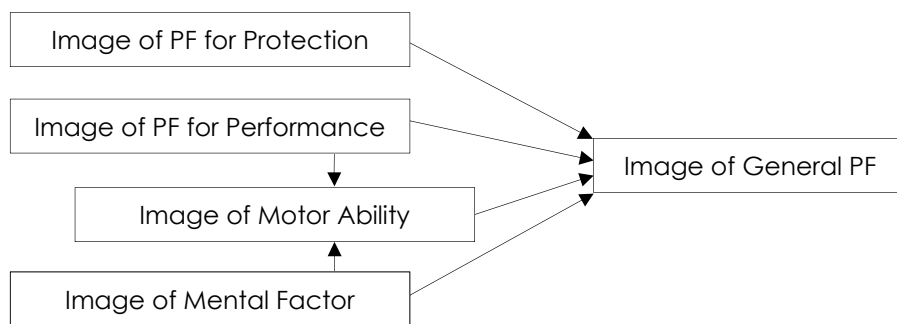


Figure 2 Hypothesized Model

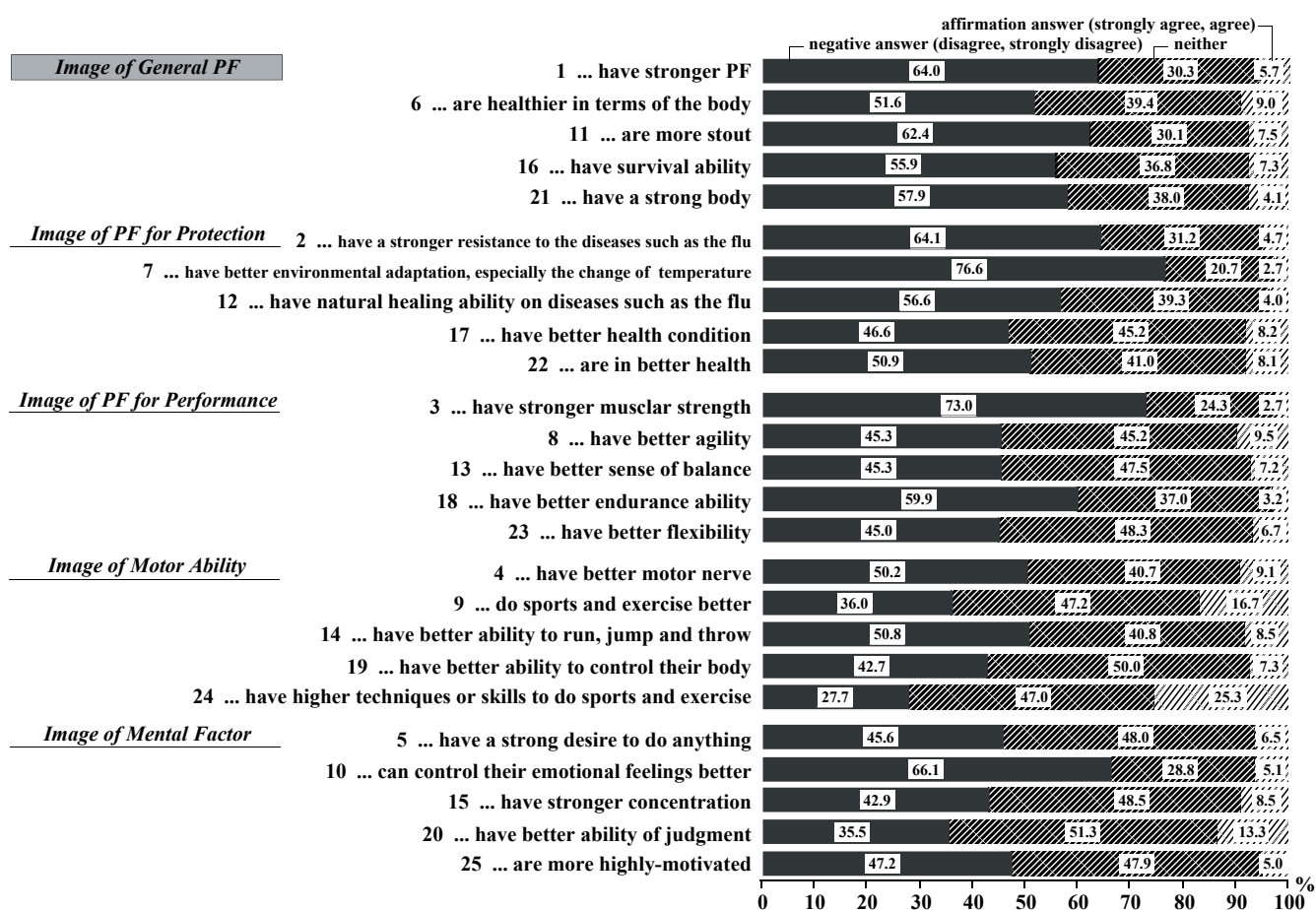


Figure 3 Distribution of the answer to actual feeling on each PF/MA element of children. Every question was asked with "Do you think children today ... than children in the past?". In addition, all answers were "strongly agree", "agree", "neither", "disagree" and "strongly disagree".

former were further classified into "PF for Protection" and "PF for Performance." The present study aiming to examine causal relationship structure of actual feelings of the public toward children's PF tried to determine the effect of each PF element on "Image of General PF."

In the meantime, MA is regarded as a phenomenal conception when substantial conceptions of "PF for Performance" and "Mental Factor" are executed

in motor events. In addition, when the term of MA is actually used, it is often synonymous to PF. Accordingly, we thought it necessary to examine actual feelings toward children's PF including MA and determined to examine "MA" → "Image of General PF" on the basis of "PF for Performance" → "MA" and "Mental Factor" → "MA."

The present study hypothesized a model shown in Figure 2 to examine the effect of PF and MA on

"Image of General PF" toward children.

2.5. Analysis Method

Each answer of the actual feelings toward children's PF/MA obtained in the questionnaire was sought in an ordinal scale, which was regarded as an interval scale in the study. Our scorings were—strongly agree: 5 points; agree: 4 points; undetermined: 3 points; disagree: 2 points; strongly disagree: 1 point. Using the scores, key statistics (mean, SD, kurtosis, skewness) were calculated in each question item to check the distribution. Each observed variable score was a sum obtained from the questions. Validity of observed variables (image of general PF; image of PF for protection; image of PF for performance; image of MA; image of mental factor) was determined by explanatory factor analysis (factor extraction: maximum likelihood, decision of the number of factors: more than 1 in eigenvalue) and reliability by Cronbach's coefficient α .

The last procedure for the work noted above was to examine the effect of PF/MA elements on "Image of General PF" by path analysis. In addition, actual feelings toward children's PF/MA must be different between those who had daily contact with multiple children so that they could closely observe children's life and motor events and those who did not. Therefore, the model was set up respectively for Non-Teacher Group and Teacher Group by multi-group analysis, which allows verifying goodness of fit of each model under every conceivable equivalence constraint pattern. Following Suzuki and Nishijima (2005), indicators to evaluate validity of the models were AGFI (adjusted goodness of fit index), CFI (comparative fit index), RMSEA (root mean square error of approximation), AIC (Akaike information criterion), and chi square values. In comparison of the Non-Teacher Group model with the Teacher Group model, AIC and chi square value difference tests were used to determine overall appropriateness of the models. The standard to accept the model was more than around 0.95 in AGFI and CFI. AGFI is adjusted from GFI by degree of freedom. GFI is the proportion of variance in the sample variance covariance matrix. CFI estimates the fit of a model by comparing it with an independent model. In RMSEA, which is obtained by subtracting degree of freedom from the minimum distance between a model and true population

variance covariance matrix, the model is considered adequately fit when the value is less than 0.05. In AIC, it can be interpreted that its absolute value has little meaning but that the model fits better when it has a smaller value than the other model (Kano and Miura, 2003).

These statistical analyses used SPSS11.5J and Amos5.0J and the significance level was set to be 5%.

3. Results

3.1. Attributes of the subjects and outline of children imagined by the subjects

Table 1 shows the attributes of the subjects. The table finds that "female" accounted for 87.0% in sex, "30's": 32.3% and "40's": 57.2% in age, and "mother": 83.4% in relationship. The subjects who "engaged in children-related job" accounted for 19.1% with 57.1% being "teacher".

Table 2 shows the subjects' imagination about the age phase of children today and the time range when children in the past were living. This table explains that the highest age phase imagined by the subjects was "elementary school children" (87.6%), which was followed by "junior high school students" (55.8%). The highest time when children in the past was imagined by the subjects was "the 1960's" (59.7%), which was followed by "the 1970's" (45.8%).

3.2. Outline of actual feelings toward children's PF

Figure 3 shows the distribution by combining two affirmative answers ("strongly agree" and "agree") and two negative answers ("disagree" and "strongly disagree") for the subjects' actual feelings toward children's PF. The figure found that to the question items asking "Do you think children today ... than children in the past?" the answers with higher distribution were "strongly disagree" and "disagree." This could be interpreted that children today were less capable than children in the past. In verification of the proportion according to each PF/MA element, the values were 46.6% to 76.6% in "Image of PF for Protection", 45.0% to 73.0% in "Image of PF for Performance", 27.7% to 50.8% in "Image of MA", and 35.5% to 66.1% in "Image of Mental Factor."

Table 3 Question items and basic statistics

General PF image & Elements of PF/MA	No.	Question ¹⁾	Mean \pm S.D. ²⁾	Skewness	Kurtosis	Reliability ³⁾
Image of General PF	1	... have stronger PF	2.32 \pm 0.76	0.45	0.42	0.82
	6	... are healthier in terms of the body	2.51 \pm 0.77	0.24	-0.03	
	11	... are more stout	2.35 \pm 0.78	0.43	0.17	
	16	... have survival ability	2.44 \pm 0.74	0.25	-0.08	
	21	... have a strong body	2.39 \pm 0.68	0.11	-0.17	
Image of PF for Protection	2	... have a stronger resistance to the diseases such as the flu	2.30 \pm 0.73	0.27	0.04	0.83
	7	... have better environmental adaptation, especially the change of temperature	2.09 \pm 0.70	0.49	0.76	
	12	... have natural healing ability on diseases such as the flu	2.39 \pm 0.71	0.10	0.06	
	17	... have better health condition	2.55 \pm 0.74	0.01	-0.15	
	22	... are in better health	2.49 \pm 0.76	0.05	-0.30	
Image of PF for Performance	3	... have stronger muscular strength	2.16 \pm 0.69	0.35	0.38	0.76
	8	... have better agility	2.59 \pm 0.75	0.04	-0.19	
	13	... have a better sense of balance	2.56 \pm 0.71	-0.04	-0.11	
	18	... have better endurance ability	2.34 \pm 0.69	0.07	-0.06	
	23	... have better flexibility.	2.56 \pm 0.71	-0.08	-0.09	
Image of Motor Ability	4	... have better motor nerves	2.51 \pm 0.79	0.14	-0.11	0.85
	9	... do sports and exercise better	2.78 \pm 0.80	0.05	-0.17	
	14	... have better ability to run, jump and throw	2.52 \pm 0.75	0.19	-0.11	
	19	... have better ability to control their body	2.60 \pm 0.70	-0.09	-0.06	
	24	... have higher techniques or skills to do sports and exercise	2.95 \pm 0.80	-0.16	-0.37	
Image of Mental Factor	5	... have a strong desire to do anything	2.55 \pm 0.73	-0.04	0.10	0.81
	10	... can control their emotional feelings better	2.23 \pm 0.78	0.25	-0.26	
	15	... have stronger concentration	2.60 \pm 0.73	-0.09	-0.14	
	20	... have better ability of judgment	2.74 \pm 0.75	-0.14	-0.14	
	25	... are more highly-motivated	2.51 \pm 0.71	-0.17	-0.10	

¹⁾ Every question was asked with "Do you think children today ... than children in the past?". In addition, all answers were given as "strongly agree", "agree", "neither", "disagree" and "strongly disagree".

²⁾ The provided answer was converted into "strongly agree": 5 points, "agree": 4 points, "neither": 3 points, "disagree": 2 points and "strongly disagree": 1 point. Therefore, children today having higher ability correlates with a higher score.

³⁾ Cronbach's coefficient α

Overall, the question items concerning "Image of PF for Protection" tended to obtain higher values than the other elements.

Further, **Table 3** shows the mean, SD, kurtosis, and skewness through calculation of scores from the obtained answers in each question item. The mean with higher values in this table implied that the subjects actually felt more that children today had higher ability. The mean in every question item, however, did not reach the theoretical mean of 3.0. Specifically, in the observation of each PF/MA element, the means were: 2.09 to 2.55 in "Image of PF for Protection", 2.16 to 2.59 in "Image of PF for Performance", 2.51 to 2.95 in "Image of MA", and 2.23 to 2.74 in "Image of Mental Factors". This means that the question items relating to "Image of PF for Protection" had a tendency of presenting low values whereas kurtosis (-0.17 to 0.49) and skewness (-0.37 to 0.76) were distributed rather evenly. The distribution verified that all question items were applicable for further path analysis.

3.3. Examination of the hypothesized model of actual feelings for children's PF

Next, validity of each observed variable and reliability were explored. The results concerning validity are shown from **Table 4** to **Table 8**. The contribution rate of each observed variable was: 49.31% in "Image of General PF", 49.26% in "Image of PF for Protection", 44.33% in "Image of PF for Performance", 53.41% in "Image of MA", and 46.62% in "Image of Mental Factors". Every observed variable presented moderate values. As shown in **Table 3**, the confidence coefficient was 0.76 to 0.85. It demonstrated that each observed variable was highly confident.

Regarding the results of validity and confidence in the observed variables, **Figure 4** shows the final solution (standardized solution) of the causal relationship structure model for actual feelings of each PF/MA element, which affected children's "Image of General PF" held by all samples. The goodness of fit of this model was: AGFI=0.998, CFI=1.000, RMSEA=0.000, AIC=28.476, and χ^2

Table 4 Exploratory factor analysis of the questions about "Image of General PF"

No.	Question	F1	Communality
1	... has excellent P.F..	.586	.343
6	... has healthy body.	.678	.460
11	... has stout body.	.719	.517
16	... has P.F. to be necessary for survival and/or life.	.704	.496
21	... has strong body.	.806	.650
Factor contribution		2.47	
Contribution rate (%) ¹⁾		49.31	

¹⁾ Contribution rate (%) : contribution rate for all variance
Factor extraction : maximum likelihood

Table 5 Exploratory factor analysis of the questions about "Image of PF for Protection"

No.	Question	F1	Communality
2	... has resistance to disease such as cold etc..	.730	.533
7	... has resistance to heat and/or cold.	.613	.376
12	... heals well from disease such as cold etc..	.795	.632
17	... has good condition.	.627	.393
22	... has a strong body with few diseases etc..	.727	.528
Factor contribution		2.46	
Contribution rate (%) ¹⁾		49.26	

¹⁾ Contribution rate (%) : contribution rate for all variance
Factor extraction : maximum likelihood

Table 6 Exploratory factor analysis of the questions about "Image of PF for Performance"

No.	Question	F1	Communality
3	... has strong muscular strength.	.636	.405
8	... has excellent agility.	.704	.495
13	... has excellent balance.	.748	.560
18	... has excellent endurance ability.	.632	.399
23	... has excellent flexibility.	.598	.357
Factor contribution		2.22	
Contribution rate (%) ¹⁾		44.33	

¹⁾ Contribution rate (%) : contribution rate for all variance
Factor extraction : maximum likelihood

Table 7 Exploratory factor analysis of the questions about "Image of Motor Ability"

No.	Question	F1	Communality
4	... has good motor nerves.	.754	.568
9	... has ability to do exercise and/or sports well.	.810	.657
14	... has excellent ability to run, jump and throw.	.718	.515
19	... has ability to control their body.	.637	.406
24	... has excellent exercise and/or sports technique.	.724	.524
Factor contribution		2.67	
Contribution rate (%) ¹⁾		53.41	

¹⁾ Contribution rate (%) : contribution rate for all variance
Factor extraction : maximum likelihood

Table 8 Exploratory factor analysis of the questions about "Image of Mental Factor"

No.	Question	F1	Communality
5	... has an attitude to work on things eagerly	.669	.448
10	... has ability to control feelings.	.593	.352
15	... has strong concentration.	.723	.523
20	... has ability of judgment.	.646	.418
25	... has strong motivation and/or will.	.769	.591
Factor contribution		2.33	
Contribution rate (%) ¹⁾		46.62	

¹⁾ Contribution rate (%) : contribution rate for all variance
Factor extraction : maximum likelihood

=0.476 (df=1). Every indicator satisfied the standard to adopt the model. Also, the path coefficient to "Image of General PF" from each PF/MA element was: 0.54 in "Image of PF for Protection", 0.26 in "Image of PF for Performance", 0.15 in "Image of MA", and 0.02 in "Image of Mental Factor"; the path coefficient to "Image of MA" was 0.76 in "Image of PF for Performance", and 0.05 in "Image of Mental Factor". These path coefficients were all significant except for "Image of Mental Factor" → "Image of General PF".

Table 9 shows the goodness of fit of the model under primary equivalence constraint patterns by multi-group analysis. This table shows that in all cases the model's goodness of fit satisfied the adoption standard under every equivalence constraint. In AIC, the severest constraint of the model, "all equivalence" ("Model B" hereafter) shows the second lowest next to the model equated entirely except for "Image of Mental Factor" → "Image of MA" ("Model A" hereafter). Next, in testing the difference in chi square values between Model A and Model B, no statistical significant differences were observed between the models. It was verified that the models of Non-Teacher Group and Teacher Group were the same.

4. Discussion

4.1. Children imagined by the subjects

The relationship of the subjects with children and how they imagined the children in answering this questionnaire might affect actual feelings for PF/MA elements. Because of this, it was thought necessary to grasp the outline.

The subjects of this questionnaire

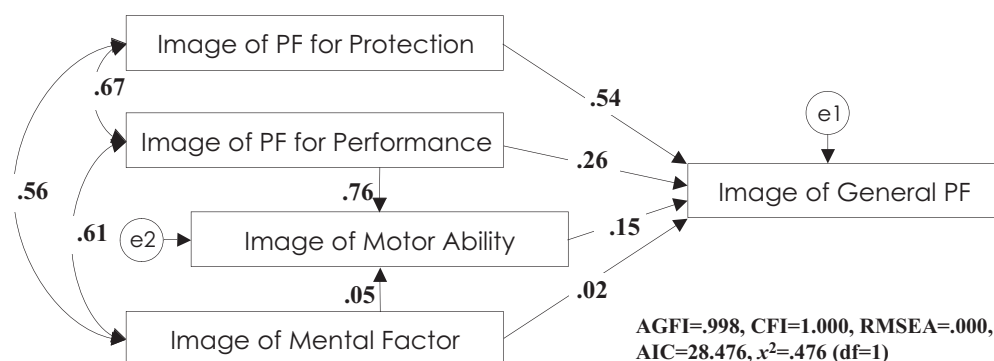


Figure 4 The structure of causal relationship among actual feelings against “General PF Image” of children by all samples

Table 9 Model conformity degree under each equivalence constraint in multi-group analysis

The pattern of equivalence constraint	χ^2	df	AGFI	CFI	RMSEA	AIC
Unchanged	0.631	2	0.997	1.000	0.000	56.631
Only “Image of PF for Protection” → “Image of General PF”	0.970	3	0.997	1.000	0.000	54.970
Only “Image of PF for Performance” → “Image of General PF”	1.001	3	0.997	1.000	0.000	55.001
Only “Image of Motor Ability” → “Image of General PF”	0.921	3	0.997	1.000	0.000	54.921
Only “Image of Mental Factor” → “Image of General PF”	1.297	3	0.996	1.000	0.000	55.297
Only “Image of PF for Performance” → “Image of Motor Ability”	1.919	3	0.995	1.000	0.000	55.919
Only “Image of Mental Factor” → “Image of Motor Ability”	3.938	3	0.989	1.000	0.015	57.938
Except “Image of PF for Protection” → “Image of General PF”	5.286	7	0.994	1.000	0.000	51.286
Except “Image of PF for Performance” → “Image of General PF”	4.999	7	0.994	1.000	0.000	50.999
Except “Image of Motor Ability” → “Image of General PF”	5.323	7	0.993	1.000	0.000	51.323
Except “Image of Mental Factor” → “Image of General PF”	4.534	7	0.995	1.000	0.000	50.534
Except “Image of PF for Performance” → “Image of Motor Ability”	5.355	7	0.993	1.000	0.000	51.355
Except “Image of Mental Factor” → “Image of Motor Ability”	3.336	7	0.996	1.000	0.000	49.336
All equivalence	5.356	8	0.994	1.000	0.000	49.356
Comparison of models		χ^2 difference	df difference	p		
Besides “Image of Mental Factor” → “Image of Motor Ability” (Model A ¹⁾) v.s. All equivalence (Model B ²⁾)		2.02	1	N.S. ³⁾		

¹⁾ Model A equated entirely except for the path coefficient from “Image of Mental Factor” to “Image of Motor Ability”.

²⁾ Model B equates every path coefficient.

³⁾ N.S.: not significant difference.

were mostly "mother" (83.4%). It was expected that the respondents were those who had contact with children mostly at home. The age phase of children imagined by the subjects were largely "elementary school children" (87.6%) and "junior high school students (55.8%). Because the question form was distributed at 7 elementary schools and 4 junior high schools, the age phase of the children imagined by the subjects should be greatly influenced by the age phase of children with whom they have daily contact.

On the other hand, "the 1960's" (59.7%) and "the 1970's" (45.8%) were the top two imagined time periods of children in the past. The highest age phase of the subjects themselves was "40's" (57.2%) followed by "30's" (32.3%). Therefore, the subjects might imagine that children in the past were those who spent their childhood when they were children themselves.

Children of "the 1970's" imagined by the subjects most to be the children in the past maintained

relatively high standard of "PF performance" (Nishijima, et al., 2001, 2003; Noi and Masaki, 2002). It was the emerging time when "physical abnormalities" (‘a little concerned’ or ‘something is wrong’) were actually felt (Masaki, 2000).

4.2. Actual feelings toward children’s PF

From the result shown in **Figure 3** and **Table 3**, there were more worries about PF of children today than those in the past in every PF/MA element. Above all, the question items relating to "Image of PF for Protection," which comprised elements of the immune system, autonomic nervous system, and hormonal system, showed stronger tendency of worries than the question items relating to the other elements. Naturally, the distribution of the obtained answers and figurative scores should be discussed with great care. In calculation of mean and SD of total scores in each PF/MA element based

on the obtained answers, the values were "Image of PF for Protection": 11.82 ± 2.80 , "Image of PF for Performance": 12.21 ± 2.64 , "Image of MA": 13.36 ± 3.03 , and "Image of Mental Factors": 12.61 ± 2.78 .

Thus, the result of the factual survey relating to children's physical condition might demonstrate the public's actual feelings of worries about children's "PF for Protection".

For instance, according to the "Survey on the Health Condition of Students in Fiscal Year 2004" by the Japanese Society of School Health (Japanese Society of School Health, 2006), children "presently (within less than one year) diagnosed as allergic by a medical doctor" accounted for 18.8%. This means one out of five children had an allergy. If children "previously (more than one year before) diagnosed as allergic by a doctor" were added, the sum became 49.1%. About half of the children had been diagnosed as having "allergy". The result implies that a fairly large number of children had derangement in their immune system.

Meanwhile, children today might have problems in developing the autonomic nervous system and regulating its condition. The appearance rate of poor function in blood pressure regulation and its chronological change were checked from the survey results conducted by measuring the reflection of blood pressure upon sudden change in position (Fukuda, 1947). A survey by Ikai, et al., (1956) found that the poor function decreased with age and that the children back then had smooth development in the function of autonomic nervous system. Whereas a 1984 survey conducted by Masaki (1986) had a slower decreasing rate and surveys conducted in the 1990's (Fujiiwa and Masaki, 1997; Tsukada, et al., 1997) and in the 2000's (Noi, 2004) had much higher rates; almost 80% of children were judged as having poor function.

In Japan, a tendency of children's low body temperature (Kobayashi, et al., 1982; Akiyama, 1983), which has been pointed from around the early 1980's, also implies developmental disorders of autonomic nervous system and physical disorder. Concerning this, the tendency of children's condition of low body temperature was reported (Noi, et al., 2003) along with many other fact surveys. The report indicates that when a low body temperature group (less than 36.0°C) was compared with a normal temperature group ($36.0\text{-}36.9^{\circ}\text{C}$) in the auxiliary temperature at wakening time, it was found that; i)

the body temperature was rather low the whole day; ii) the time range when the body temperature reached the peak was delayed; iii) the body temperature showed great differences between wakening time and bed time; and iv) "intrinsic motivation to attend school" at wakening time was low.

Thus, the result of the factual surveys relating to children's physical condition might be sensitive enough to catch actual feelings of the public about concerns of children's PF.

As previously mentioned, many children in the past imagined by many subjects in the present survey used to have high "performance PF" with lowering "PF for protection" hidden behind. Concerning "physical disorder", they were children who lived in the period when such a phenomenon was actually felt. Still, the fact that there is a concern about declining "PF for protection" of the present children implied that the concern is becoming greater. At the same time, practice in the fields of nursery/education does not necessarily contribute to clearing of social anxiety in association with children's "PF for protection".

4.3. Causal relationship structure of actual feelings relating to children's PF

Many reports have been published in the fields of school health and physical education using multivariate analysis (Kumeno, et al., 1979; Hattori and Hiki, 2000; Nishijima, et al., 2000; Kokudo, et al., 2001; Suzuki, et al., 2002; Aoki, 2002; Kobayashi, 2003; Suzuki and Nishijima, 2005). However, the number of reports on children's PF and MA is limited (Hattori and Hiki, 2000; Suzuki, et al., 2002; Suzuki and Nishijima, 2005). Besides, even now when people pay much attention to children's "declining PF," the causal relationship structure of actual feelings toward children's PF persistent in the public has not yet been examined.

When children's "declining PF" is a grave social problem, data on the reality of children's PF/MA should be accumulated to take effective measures. Similarly, detailed analysis on structure of actual feelings of the public is also needed. Therefore, the present study was conducted to clarify substance of actual feelings toward children's PF and its causal relationship structure.

From the result of the total samples in path analysis, the causal relationship structure model of

actual feelings toward children's PF satisfied the standard to adopt the model in every indicator of goodness of fit (**Figure 4**). However, the model might have differences between the groups: one which could observe many children on a daily basis like teachers, and the other which could not. Therefore, the present study set up a model respectively for Non-teacher group and Teacher group, and goodness of fit of the models was compared under each equivalence constraint by multi-group analysis (**Table 9**). As a result, all models under equivalence constraint including the severest constraint group, model B (all equivalence), satisfied the standard for its adoption. Also, from the result of the model comparison, we determined that the Non-teacher group and the Teacher group models were equivalent. Thus the actual feelings toward children's PF could be interpreted by the models shown in **Figure 4**.

When observing the causal relationship structure models obtained through the procedure, it was found that the PF/MA element having the strongest relationship with "Image of General PF" was "Image of PF for Protection." Neither "Image of PF for Performance"—image of what the term, PF, easily brings to mind—nor "MA image—image of the conception of the phenomenal event—was the strongest.

Hattori and Hiki (2000), studying junior high school students of Ibaraki Prefecture, examined correlation of self-recognition of performance PF, protection PF and mental consistency with perceived health. They elucidated that perceived health of junior high school students was affected by self-evaluation on protection PF. The result was interesting because it was useful for understanding elements forming children's perceived health. Despite the differences from the research design of the present study in terms of comprising conception of models, "health" perceived by junior high school students and children's PF image actually felt by the public were strongly led by "Image of PF for Protection".

In either case, when imagining children's PF or the broader conception of "health", the elements of "Image of PF for Protection" might affect the most. In other words, when they were discussed using the vague terms of PF or "health", a dominant view was that they were discussing "protection PF".

Thus, to clear actual feelings of children's

"declining PF" continually felt by the public, practice should focus on "PF for protection".

Yet, there exists a research report stating that we had not faced such actual feelings and reality and that we had never set "PF promotion" as a target of practice for Japanese schools (Noi, et al., 2001). This means that even if children's declining "protection PF" is actually felt and we are ready to tackle it, too much focus might be placed on improvement of "performance PF" and "MA", which are easily imagined by the term of PF. Accordingly, the conventional term of "PF promotion" is inappropriate to express these tasks because the image is fixed to develop practice of conventional "PF promotion" into tasks covering "protection PF".

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