



Variations in Children's Social and Emotional Skills Scores by Physical Activity Level: A Proposal for a Short OECD Social and Emotional Skills Scale



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1. Background and Purpose

Children's physical activity (PA) has various educational effects and improves physical fitness and health. However, children have lost interest in physical activity, and video games are the most popular form of play. Regarding educational effects, non-cognitive and cognitive skills have been emphasized recently. This also applies to physical activity. Non-cognitive skills are called social and emotional skills (SES) by the Organization for Economic Co-operation and Development (OECD), and research results of international comparisons have recently been published. However, the number of participating countries was limited in this survey. As such, there is a lack of understanding regarding the current situation of children's SES, including the importance of SES as an educational effect.

This study aimed to construct and validate the OECD SES scale short version and to examine the relationship between OECD SES scale scores and elementary school children's physical activity habits.

Methods

[Participants]

The participants were 2223 elementary school children in Grades 4–6. Among these, 2098 participants who indicated their sex were included in the analysis. The detailed number of participants is shown in Table 1.

Table 1. Number of Participants

	Grade4	Grade5	Grade6	Total
Boys	367	329	381	1077
Girls	345	323	348	1016
Total	713	655	730	2098

[Measurement Items]

(Physical activity habits)

The following items were investigated using a questionnaire:

- Physical activity preference (four-point Likert scale)
- Confidence in own physical fitness (four-point Likert scale)
- Physical activity in young child (five-point Likert scale)
- Number of friends to play with (four-point Likert scale)
- Physical activity time (weekdays or weekends)
- Comparison between outdoor and indoor play (five-point Likert scale)

(SES: Social and Emotional Skills)

The original OECD SES comprises 120 items, with 15 sub-factors identified using factor analysis (OECD, 2021). Considering the burden on children, we created a short version comprising 45 items by selecting the top three items representing each factor.

[Analysis procedures]

Step1: Confirmation of the factor structure of the SES short version

The application of factor analysis to the collected data confirmed that the SES short version retains the same factor structure of 15 factors as the OECD's original dataset.

➡ Factor analysis using ML estimation and Promax rotation

Step2: Differences in each factor score and SES total score by physical activity habits

A One-way ANOVA was conducted to examine the differences in each factor score and the composite score of the 45 items (SES total) based on children's physical activity habits.

➡ One-way ANOVA with multiple comparison by the Bonferroni method

Results II: Differences in SES short version score by PA preference, confidence in own physical fitness, PA in young child and number of friends to play with

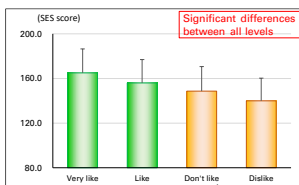


Fig1. Difference of SES score by PA preference

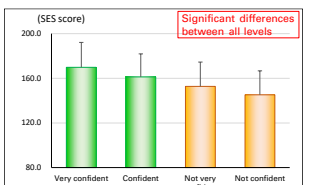


Fig2. Difference of SES score by confidence of physical fitness

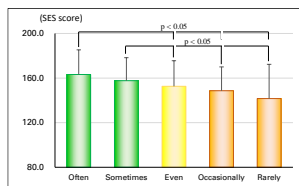


Fig3. Difference of SES score by PA in young child

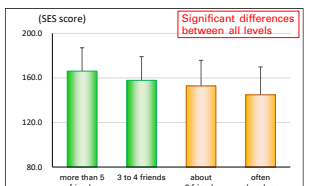


Fig4. Difference of SES score by Number of friends to play with

2. Summary of Results & Discussion

★ Factor analysis of the SES short version

A simple structure of 15 factors was confirmed. Because of high reliability coefficients were also confirmed for each factor, confirming the validity of the SES short version. The SES short version adequately assessed children's SES.

★ Difference in SES short version scores by PA preference, confidence in own physical fitness, PA in young child, Number of friends to play with

PA preference, confidence in own physical fitness, PA in young child, and number of friends to play were associated with the SES short version total score. The SES short version total score increased through the cultivation of a preference for physical activity and by increasing the number of friends to play with from an early age.

★ Difference in SES short version scores by PA time and outdoor play

Both weekday and weekend PA times and the frequency of outdoor play were associated with the SES short version total score. In particular, it is suggested that increased PA on weekends increased the total SES score.

It is suggested that children's participation in physical activity, exercise, and sports can effectively improve their SES.

Results I: Factor analysis of SES short version

Table 2. Result of factor analysis

Items	Asset	Co	Self	Tenness	Energy	Perse	Curiosity	Trust	Socials	Co	Intention	Empathy	Respect	Stress	Optimism	Self
I like to be a leader in my class	0.91	0.01	-0.02	0.01	-0.03	-0.01	-0.02	-0.05	0.04	0.02	-0.09	-0.01	0.04	0.02	0.85	
I enjoy leading others	0.84	-0.02	0.02	0.01	0.01	-0.04	0.06	0.00	-0.05	-0.02	0.04	-0.08	0.01	0.01	0.72	
I am dominant, and act as a leader	0.75	0.00	-0.05	-0.03	-0.02	-0.02	-0.03	0.06	-0.02	-0.02	0.04	0.06	-0.05	-0.01	0.58	
I like to create things	-0.02	0.89	-0.02	-0.02	-0.03	0.04	-0.04	-0.02	-0.02	-0.01	0.01	-0.03	0.00	-0.02	0.89	
I am original, come up with new ideas	0.02	0.81	0.04	0.03	0.02	-0.04	-0.01	-0.03	-0.02	-0.03	0.01	0.00	0.02	-0.03	0.66	
I have a good imagination	-0.02	0.78	-0.03	-0.02	-0.01	-0.01	0.06	-0.03	-0.02	-0.02	0.02	0.03	0.02	-0.02	0.62	
I keep to think before acting	-0.01	-0.02	0.93	0.01	-0.01	0.00	-0.01	0.00	0.00	0.01	-0.03	0.03	-0.07	-0.03	0.88	
I think carefully before doing something	0.07	0.04	0.88	-0.01	0.02	0.01	0.03	0.02	0.00	-0.02	0.01	-0.03	-0.05	-0.05	0.83	
I often rush into action without thinking	-0.05	-0.03	0.58	-0.02	-0.04	-0.09	-0.05	-0.05	-0.01	0.02	0.03	0.01	0.30	0.08	0.83	
I ask questions about other cultures	-0.03	0.01	0.95	0.89	-0.02	-0.02	0.00	0.00	-0.01	-0.05	-0.03	-0.01	0.05	0.02	0.80	
I like hearing about other cultures and religions	-0.01	0.01	0.91	0.83	-0.01	-0.02	-0.01	-0.01	-0.02	-0.02	-0.01	-0.02	-0.02	0.00	0.70	
I am willing to be friends with people from other cultures	0.03	-0.01	-0.08	0.67	0.08	-0.01	0.01	0.01	0.02	0.01	0.05	0.04	0.00	-0.05	0.66	
I am full of energy	0.01	0.00	0.00	-0.02	0.84	0.00	-0.02	0.00	-0.06	0.03	-0.01	0.02	-0.02	-0.04	0.83	
I maintain high energy throughout the day	-0.09	0.01	0.03	0.02	0.65	0.00	0.04	0.02	0.04	-0.03	0.03	-0.02	-0.01	0.04	0.69	
I have less energy than my classmates	-0.10	-0.01	-0.05	0.00	0.59	-0.03	-0.02	-0.02	0.07	0.01	-0.04	-0.01	0.10	0.06	-0.02	0.58
I keep working on a task until it is finished	-0.02	0.00	-0.02	-0.01	0.83	0.04	-0.01	-0.03	-0.01	-0.02	-0.01	0.01	-0.04	0.03	0.81	
I make sure that I finish tasks	-0.02	0.00	-0.08	-0.02	-0.01	0.83	-0.03	0.02	-0.03	-0.03	-0.01	-0.02	0.10	0.00	0.64	0.71
I finish what I start	-0.02	0.01	0.28	0.05	0.99	0.50	0.02	0.04	0.00	-0.01	0.04	-0.02	-0.05	0.04	-0.03	0.34
I like learning new things	-0.06	0.02	0.03	0.01	0.04	-0.03	0.87	0.00	0.06	0.02	-0.03	0.02	-0.01	0.02	-0.06	0.77
I love learning new things in school	0.00	-0.03	-0.08	0.00	0.02	0.00	0.80	0.05	-0.04	-0.02	0.02	0.01	0.00	0.00	0.64	0.65
I am eager to learn	0.06	0.02	0.05	0.00	-0.06	0.02	0.79	-0.01	0.00	-0.02	-0.01	-0.02	0.03	-0.03	0.62	0.64
I trust others	0.05	0.01	-0.02	-0.01	0.00	-0.01	-0.02	1.00	0.02	-0.11	0.02	0.01	0.06	-0.04	-0.05	1.02
I believe that other people will help me	-0.02	0.01	0.04	-0.02	-0.02	-0.01	-0.05	0.56	0.07	0.14	-0.02	0.01	0.01	0.03	0.10	0.55
I believe that most people are honest	-0.03	-0.04	-0.01	0.03	0.02	0.02	0.12	0.50	-0.11	0.11	-0.02	0.01	-0.07	0.06	-0.01	0.30
I make friends easily	-0.03	0.00	-0.01	-0.01	-0.02	0.01	0.04	-0.02	0.95	-0.01	-0.01	-0.01	-0.01	0.00	0.90	0.90
I have many friends	-0.04	-0.01	0.04	-0.03	0.04	0.02	0.03	0.89	-0.01	-0.01	0.00	0.01	-0.05	0.01	0.81	0.81
I am outgoing and sociable	0.16	0.00	-0.07	0.05	0.07	0.00	-0.02	0.61	0.05	0.02	-0.02	-0.03	0.04	0.01	0.61	0.61
I am always willing to help my classmates	-0.02	-0.03	0.01	-0.03	0.01	0.01	0.02	-0.03	0.95	-0.01	-0.05	0.01	-0.04	-0.02	0.82	0.82
I like to help others	0.08	-0.02	-0.06	0.05	0.02	-0.02	0.00	0.01	0.96	0.77	0.01	0.01	-0.02	0.03	0.64	0.62
I am ready to help anybody	-0.07	0.03	0.06	-0.04	-0.01	-0.01	-0.02	0.96	-0.01	0.77	0.01	0.07	0.09	0.00	0.60	0.63
I know how to control my anger	-0.02	0.00	-0.02	0.00	0.01	0.00	0.01	0.01	-0.01	0.02	0.96	-0.07	-0.02	-0.09	-0.08	0.94
I keep my emotions under control	0.02	0.04	0.03	-0.03	0.04	0.00	-0.02	0.04	-0.01	0.02	0.67	0.11	-0.03	0.01	0.06	0.47
I get mad easily	-0.10	-0.04	0.01	0.04	-0.08	-0.01	0.00	0.02	0.00	0.00	0.51	-0.01	0.06	0.19	0.04	0.12
I understand what others want	0.03	-0.01	0.03	0.00	0.00	0.01	0.04	-0.01	-0.02	-0.06	-0.01	0.90	-0.03	-0.02	-0.01	0.83
I am someone whom others feel	-0.05	-0.01	-0.03	-0.04	-0.01	-0.02	0.01	-0.01	-0.04	0.02	0.01	0.90	0.02	-0.02	0.01	0.82
I know how to comfort others	0.02	0.05	0.00	0.12	0.00	-0.01	-0.08	0.03	0.11	0.16	-0.01	0.51	-0.03	-0.01	-0.04	0.33
I often forget my dates	0.02	-0.02	-0.03	0.00	0.03	-0.02	0.01	0.02	0.00	-0.01	-0.03	0.00	0.92	-0.03	-0.03	0.86
I forget to do work I was asked to do	-0.06	0.01	0.04	0.02	0.01	0.07	0.01	0.00	-0.01	0.00	-0.05	0.02	0.82	0.02	0.01	0.68
I am a responsible person	0.24	0.00	0.04	-0.02	-0.02	0.20	0.06	-0.05	-0.04	0.12	0.04	0.08	0.24	0.15	0.01	0.21
I get nervous easily	-0.10	0.04	-0.03	0.01	-0.03	0.05	0.01	0.00	-0.03	-0.04	-0.04	0.00	-0.02	0.72	-0.08	0.54
I am often worried about something	0.00	0.04	-0.03	0.01	0.05	-0.02	0.00	0.01	-0.01	0.02	0.01	-0.08	-0.08	0.66	-0.03	0.46
I panic easily	0.00	-0.07	-0.03	-0.04	0.02	-0.02	-0.02	0.01	0.00	-0.07	0.06	-0.09	0.11	0.60	0.08	0.40
I am a happy person	0.03	0.01	-0.02	-0.02	0.04	0.01	-0.03	0.00	-0.06	-0.04	-0.03	-0.01	0.01	0.03	0.90	0.82
I enjoy life	-0.01	-0.02	0.00	0.02	0.13	0.02	0.01	0.01	0.03	-0.05	-0.01	-0.01	-0.03	-0.06	0.74	0.57
I look on the bright side of life	0.03	0.04	0.04	0.01	-0.02	-0.04	0.09	0.01	0.01	0.02	0.06	0.00	-0.03	0.07	0.41	0.21
Eigenvalue	2.26	2.09	2.12	1.96	1.72	1.88	2.08	1.58	2.14	2.11	1.66	1.96	1.75	1.43	1.59	28.34
Cumulative Proportion (%)	0.03	0.07	0.13	0.18	0.22	0.26	0.31	0.39	0.41	0.46	0.48	0.51	0.54	0.56	0.59	0.99

Factor analysis was applied to the SES short version data and a simple structure of 15 factors was confirmed. The total explained variance was 63.0%, and high reliability coefficients were confirmed for all aspects. The SES short version was proposed to adequately assess SES.

Results III: Difference of SES short version scores by PA time and outdoor play

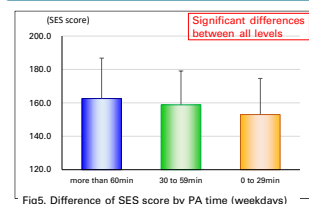


Fig5. Difference of SES score by PA time (weekdays)

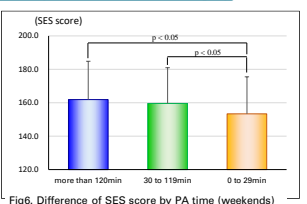


Fig6. Difference of SES score by PA time (weekends)

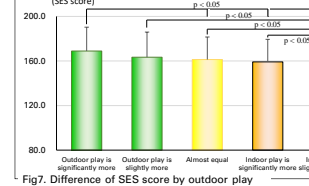


Fig7. Difference of SES score by outdoor play

PA preference, confidence in own physical fitness, PA in young children, and number of friends to play with were associated with the SES total score. The SES scores increased through the cultivation of a preference for physical activity and by increasing the number of friends to play with from an early age.

Both weekday and weekend PA times, as well as frequency of outdoor play, were associated with the SES short version total score. The influence of weekday physical activity time was particularly clear. The results suggest that children's participation in physical activity, exercise, and sports can effectively improve their SES.