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SHORT PAPER

The Verification of Reliability and Validity of the SNEAT Based on the Data from Kagoshima Prefecture:
A Study on the Standardization of the SNEAT

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ABSTRACT

The Special Needs Education Assessment Tool (SNEAT) were verified of reliability and validity. However, the reliability and validity has been verified is only Okinawa and Miyagi Prefecture, the national data has not been analyzed. Therefore, this study aimed to verify the reliability and construct validity of SNEAT in Kagoshima Prefecture as part of the national survey. SNEAT using 32 children collected from the classes on Jiritsu-Katusdo (independent activity) for children with disabilities in Kagosima Prefecture between October and November 2015. Survey data were collected in a longitudinal prospective cohort study. The reliability of SNEAT was verified via the internal consistency method; the coefficient of Cronbach's α were over 0.7. The validity of SNEAT was also verified via the latent growth curve model. SNEAT is valid based on its goodness-of-fit values obtained using the latent growth curve model. These results indicate that SNEAT has high reliability and construct validity in Kagoshima Prefecture.

＜Key-words＞
Special Needs Education Assessment Tool (SNEAT), reliability, validity, latent growth curve model

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I. Introduction

The SNEAT (Special Needs Education Assessment Tool) is a tool to evaluate the performance of special needs education. The SNEAT was developed and its reliability and validity were verified (Han, Kohara & Kohzuki., 2015; Kohara, Kwon, & Han, et al., 2015). The SNEAT that combined HRQOL with Jiritsu-Katusdo (independent activity) that is the part of the special needs education has attracted the attention as the new tool that enables to evaluate the performance of special needs education.

However, the reliability and validity of the SNEAT have been verified with the data from Okinawa and Miyagi Prefecture, which have the necessity to collect and analyze the nationwide data for the standardization of the SNEAT brought up.

Therefore, this study aimed to report the results of the research that was conducted for Kagoshima Prefecture as the part of the standardization of SNEAT.

II. Subjects and Methods

1. Subjects and Procedures

This study was based on the method of previous studies (Kohara, Han, Kwon, et al., 2015; Han, Kohara & Kohzuki., 2016). After obtaining the school officials' consent to participate in the research in the meeting, packages containing the official document to formally request the cooperation for this study and the SNEAT manual were sent to all the participating schools. The SNEAT questionnaire sets were distributed to the 32 classes on Jiritsu-Katusdo in the 1 special needs schools in Kagoshima Prefecture. The class on Jiritsu-Katusdo was conducted once a week (four times) for one month, between October and November 2015, using SNEAT. The questionnaires were completed after the class on the independent activity; the four surveys were named as Time 1, Time 2, Time 3 and Time 4. The class participants (i.e., the teachers and students) and the class contents were the same for all the classes.

SNEAT is a tool for evaluating the educational outcome of the classes on independent activities of daily living for children with disabilities (Han, Kohara & Kohzuki., 2014). The SNEAT questionnaire has a total of 11 items in three domains (bodily pain, mental health, and social functioning) and enables the teachers to evaluate the educational outcome of their students (Han, Kohara & Kohzuki., 2014). For each item, the evaluators are asked to indicate the extent of their agreement or disagreement using a 5-point scale, where;1 = strongly disagree;2 = disagree;3 = neutral; 4 = agree; and 5 = strongly agree.

In addition, the face sheet was added to record the contents of the class and the information on the students, such as their grade level (elementary, middle, or high school), gender, and type of disability (intellectual disability, physical disability, health impairment, developmental disability, multiple disabilities). Items for recording the information on the teachers who are the evaluators of the classes were also added, such

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as their age, gender, length of teaching at a special support school, and possession of a special teaching certificate.

2. Statistics analysis

To analyze the obtained data, one-way repeated-measures ANOVA (matched design) was used. To analyze the changes of the scores, one one-way ANOVA with repeated-measures was conducted. One-way ANOVA was also conducted for the comparison of the scores of each domain.The items in each domain of SNEAT are listed in descending order of difficulty, and as such, the scores of the items in each domain are ranked in the descending orders of Q1 to Q4, Q5 to Q8, and Q9 to Q11. SPSS ver.23.0 was used for statistical analysis.

Reliability of SNEAT was estimated using the internal consistency method. The internal consistency of SNEAT was assessed with Cronbach's α. A minimum Cronbach's α co-efficient of 0.7 was considered satisfactory for group-level comparisons (Cronbach, 1951).

For this study, the latent growth curve model, and structural equation modeling (SEM), among the methods of construct validity, were utilized, and longitudinal data were employed to verify the validity of SNEAT. The latent growth curve model can be used to analyze the repeated-measures data, which is different from general path analysis (Kano & Miura, 2002). In the latent growth curve model, unlike in general path analysis, path coefficients are not the subjects of the data analysis because all the path coefficients from the observed to the latent variables are fixed parameters (Toyoda, 2007).

The model fitness was assessed with the following fit indices: comparative fit index (CFI) and root mean square error of approximation (RMSEA). When conducting analysis via structural equation modeling (SEM), the researchers themselves are to choose the fit index that they would use, based on their judgment. A model is considered acceptable, when two or more fit indices are met including RMSEA (Steiger, 1998). For adequately fitting models, these fit indices should meet the following criteria: CFI > 0.90 (Han , Yajima, Lee, et al., 2005) and RMSEA < 0.1 (Koshio, 2004). In this research, maximum likelihood estimation was used for the parameter estimation. Amos ver.23.0 was employed for statistical analysis.

III. Results

1. Subject Characteristics

As the classes are usually conducted on a one-to-one basis, 32 children and 32 teachers (evaluators) participated in such classes using SNEAT. The characteristics of the participants in the said classes using SNEAT are shown in Table 1.

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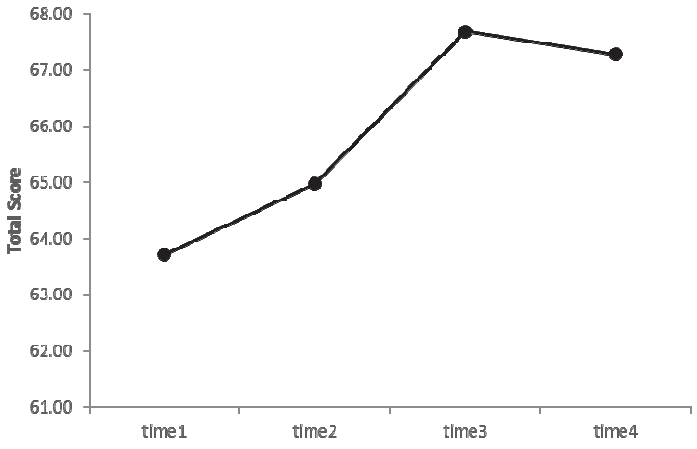
<Table 1> Characteristics of the participants in the class of students with disabilities

Characteristic			Mean±SD or n (%)
Children	Grade	Elementary school	9 (28.1)
n = 32		Middle school	11 (34.4)
		High school	12 (37.5)
	Sex	Male	15 (46.9)
		Female	17 (53.1)
	Types of disabilities	Intellectual disability	0 (0.0)
		Physical disability	9 (28.1)
		Health impairment	0 (0.0)
		Development disability	0 (0.0)
		Multiple disabilities	23 (71.9)
Teachers	Age		38.6±9.7
n = 32	Average length of teaching		14.6±9.9
	Average length of teaching for special needs education		12.0±10.4
	Sex	Male	11 (32.4)
		Female	21 (61.8)
	Special teaching certificate	With the certificate	24 (75.0)
		Without the certificate	8 (25.0)

2. The Changes and Comparisons of Total Score, Scores of Domains and Scores of Items

1) Total Score

The total scores changed from 63.72 in the Time1 to 64.97 in the Time2, 67.68 in the Time3, and 67.29 in the Time4. In the results of the analysis through one-way repeated-measures ANOVA, there were not significant differences among the first, second, third, and fourth classes (Figure 1).



<Figure 1> Changes of the total scores in Kagoshima.
One-way repeated ANOVA was used, p = n.s., n = 32

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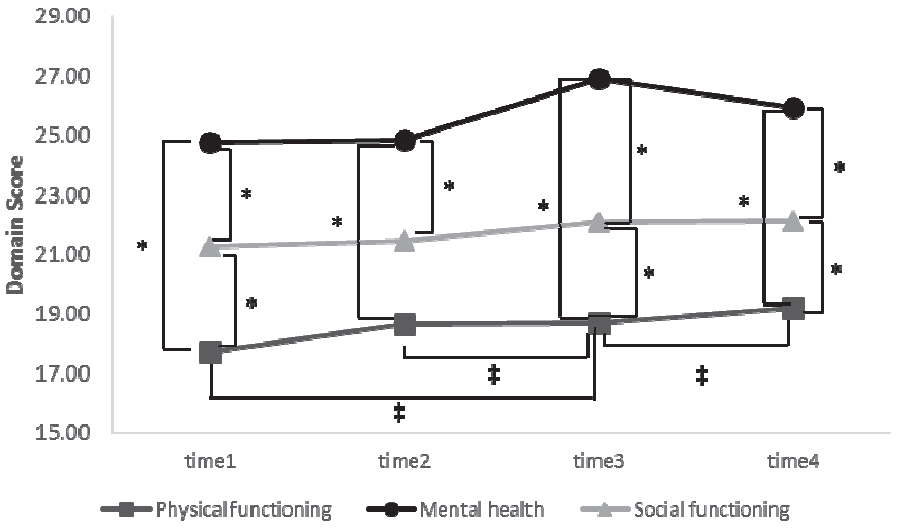
2) Domain Score

The average scores of the domain of physical functioning were 18.04±5.27 in the Time1, 18.86±4.94 in the Time2, 18.71±5.35 in the Time3, and 19.21±5.40 in the Time4. The average scores of the domain of mental health were 25.57±6.35 in the Time1, 25.14±5.58 in the Time2, 26.89±5.32 in the Time3, and 25.93±7.10 in the Time4, and those of the domain of social functioning were 21.43±4.38 in the Time1, 21.50±4.61 in the Time2, 22.07±4.94 in the Time3, and 22.14±5.10 in the Time4. In the results of the analysis through one-way repeated-measures ANOVA, there were significant differences ($p < 0.05$) among the Time1 to Time3, Time2 to Time3, and Time3 to Time4 in the domain of physical functioning. And in the results of the analysis of one-way ANOVA, there were significant differences ($p < 0.05$) among the domain of physical functioning, mental health and social functioning (Figure 2).



<Figure 2> Changes of the scores of each domain, one-way ANOVA was used, *$p < 0.05$, one-way repeated ANOVA was used, ‡$p < 0.05$, n = 32.

3) Item Score

The scores of the items decreased, with the scores of the items within each domain decreasing from Q1 to Q4, from Q5 to Q8, and from Q9 to Q11. The items of each domain of SNEAT are listed in descending order of difficulty. As such, the hypothesis was verified because the scores of each domain were ranked in the descending orders of Q1 to Q4, Q5 to Q8, and Q9 to Q11 (Figure 3).

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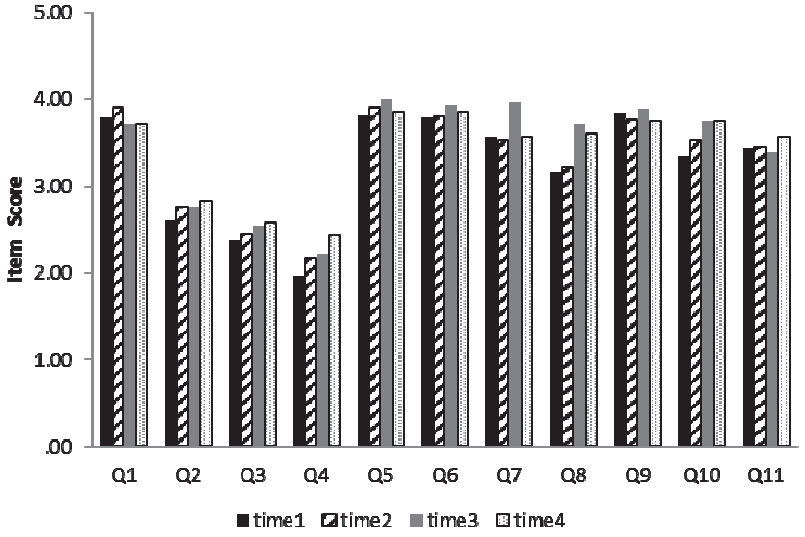

<Figure 3> Changes of each domain in Kagoshima. n = 32

3. Reliability of the SNEAT

The internal consistency reliability (Cronbach's α coefficient) ranged from 0.78 to 0.80 for all the domains, and the internal consistency reliability of all the items was 0.89 (Table 2).

<Table 2> SNEAT scale scores and Reliability Score.

Constructs	Mean	SD	Cronbach's alpha if item deleted	Cronbach's alpha
Physical function				0.78
Q1	3.71	0.66	0.15	
Q2	5.50	1.69	0.68	
Q3	5.07	2.14	0.80	
Q4	4.43	1.99	0.78	
Mental health				0.78
Q5	4.00	0.90	0.61	
Q6	7.86	1.88	0.65	
Q7	7.93	1.11	0.63	
Q8	3.13	1.92	0.60	
Social functioning				0.80
Q9	7.79	1.75	0.61	
Q10	7.50	1.77	0.81	
Q11	6.79	2.27	0.82	
All item				0.89

Q1 - Q11, (1 = minimum, 5 = maximum) α > 0.70, n = 32.

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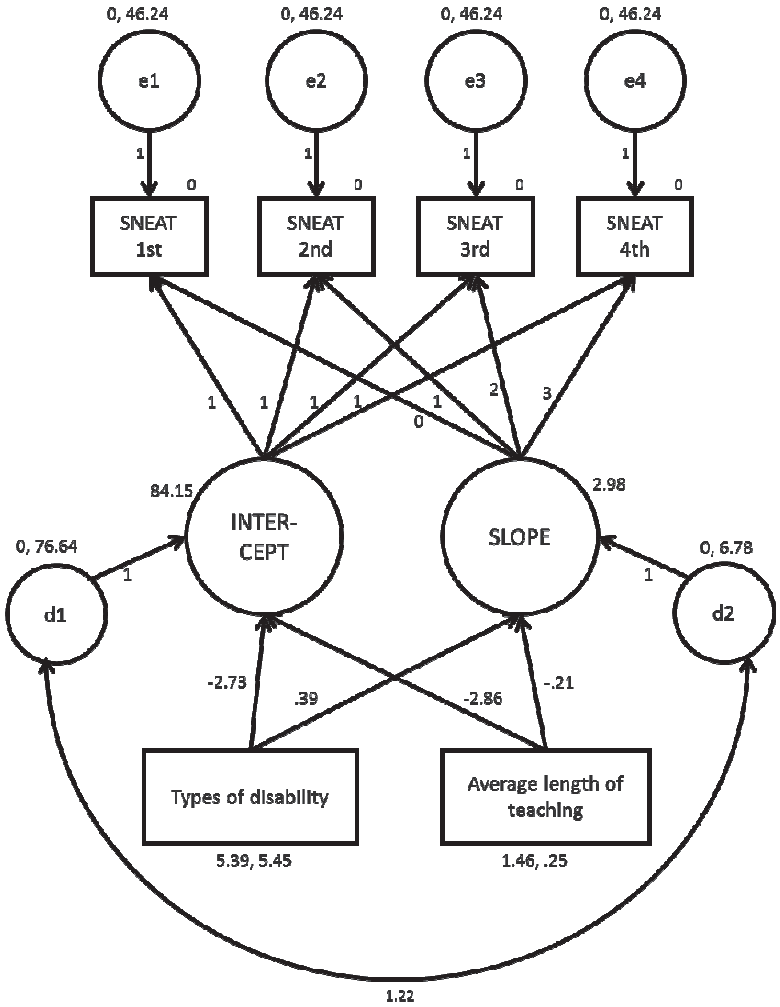
4. Validity of the SNEAT

As for the analysis via the latent growth curve model, SNEAT showed a high level of fitness: $\chi 2 = 13.63$; DF = 13; p = 0.400; CFI = 0.992; TLI = 0.990; and RMSEA = 0.042. The validity was verified because the values of CFI, TLI and RMSEA were within the goodness-of-fit range. As for the factors affecting the SNEAT scores, two factors were clearly identified: the average length of teaching and the type of disability of the student. This means that these two variables affect the evaluation of the outcome of special needs education (Figure 4).



<Figure 4> Latent curve analysis of SNEAT in Kaghosima

χ2, DF, P, CFI; comparative fit index; RMSEA; root mean square error of approximation. n = 32, χ2 = 13.63, DF = 13, p = 0.400, CFI = 0.992, TLI = 0.990, RMSEA = 0.042.

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IV. Discussion

In this study, the data from the research on Kagoshima Prefecture were analyzed as the part of the nationwide research for the standardization of the SNEAT.

The results of the research in Kagoshima Prefecture indicate that SNEAT has high reliability and construct. This result was consistent with previous studies in Okinawa and Miyagi Prefecture (Kohara, Han, Kwon, et al., 2015; Han, Kohara & Kohzuki., 2016).

As for the types of disabilities of the respondents, the proportion of students with multiple disabilities in the Kagoshima Prefecture accounted for the biggest part of all the respondents, which was not same state with the precedent study in Okinawa and Miyagi Prefecture. The proportion of evaluators with teaching license in Kagoshima was similar with that of Okinawa Prefecture. The total score and the scores of domains tended to be higher as the number of classes increased in Okinawa and Miyagi Prefecture, but the total score decreased in the time4 in Kagoshima Prefecture. The differences in the results of this study need to be studied more. It was confirmed that the scores of items of each domains also tended to rank in the same order with the level of difficulty of items of each domain, which is the same results of precedent studies

In the results of the validity via Latent growth curve modeling, it was confirmed that the two explanatory variables such as the average length of teaching and the type of disability of the student. affected the SNEAT scores. In the precedent study in Okinawa Prefecture, it was found that the four explanatory variables such as the period of teaching in special support schools, whether to have special teaching certificate, school grades and the types of disabilities affected the SNEAT scores and the goodness of fit of the model was excellent Kohara, Han, Kwon, et al., 2015). And, the precedent study in Miyagi Prefecture, it was found that two factors were clearly identified: the teacher's possession of a special teaching certificate and the type of disability of the student. (Han, Kohara & Kohzuki., 2016)

The results of the research in Kagoshima Prefecture were reported through this article. For the standardization of the SNEAT, the collection and analysis of data need to be conducted via the nationwide research. And the differences from the regions need to be studied more.

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