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Effects of Behavioral and Functional Training on Japanese Preschool Teacher Knowledge and Child Behavior

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Abstract

We conducted a school-wide training for Japanese preschool teachers based on the behavioral and functional approach to children with problem behaviors. Twenty-five Japanese teachers at a kindergarten and nursery school participated in the program, attending six training sessions and four case-study meetings. The training sessions consisted of lectures on behavioral and functional approaches, and group work to develop individual support plans. Following training, teachers' knowledge of applied behavior analysis improved, as well as children's behaviors targeted in the training plans. In addition, the overall behavior of the children improved, and the postprogram questionnaire showed that participants' satisfaction and acceptance were high. A case-study meeting had been maintained weekly at both schools for 1 year. Although these results are promising, the current investigation has limitations, and the results should be interpreted with caution.

Keywords

preschool children, problem behaviors, developmental disorders, functional approach, teacher training, Japanese kindergarten, nursery

Problem behavior in preschoolers is a critical issue, as preschool may be the child's first experience of group care and education. Some studies suggest that about 10% of preschoolers exhibit noticeable problem behaviors, with 4% to 6% of this population exhibiting serious behavioral difficulties (Raver & Knitzer, 2002). Evidence suggests that when children show behavioral problems in preschool, they are more likely to have the same problems later and/or to be diagnosed with disorders (Bayat et al., 2010). Therefore, education and welfare services have to be committed to preventing problem behaviors and implementing necessary interventions to support young children (Dunlap et al., 2006).

As many studies in this field are conducted in the United States and the United Kingdom, examining support systems that correspond to the Japanese education and welfare system (Inoue, 2019) is necessary. In Japan, the law for people with developmental disorders requires the support of students with autism spectrum disorder (ASD) or other developmental disorders in accordance with individuals' special educational needs in regular nursery schools and kindergarten classes. All teachers need to be able to learn about the characteristics of these disorders and respond to problem behaviors, and there is a need for effective preschool teacher training programs that enable this.

In recent years, many psychosocial approaches have been studied to address problem behaviors in individuals with ASD and intellectual disorder (ID). Behavioral and functional approaches to addressing problem behaviors are recognized as an evidence-based intervention strategy in many reviews of the literature on the respective subjects (Heyvaert et al., 2014; Machalicek et al., 2007). Behavioral and functional approaches incorporated by schools in many districts and school systems in North America and Europe are referred to as Positive Behavioral Interventions and Supports (PBIS; Sugai & Horner, 2006). The School-Wide Positive Behavioral Intervention and Support (SW-PBIS; Sugai & Horner, 2006) is a data-based decision-making system that uses a multitiered approach to match the intensity of the interventions with the needs of students. SW-PBIS integrates universal behavioral strategies focused on prevention and a functional approach at the top tier. Recently, many evidence-based studies have been conducted regarding class-wide interventions in preschools. The Class-Wide Function-Related Intervention Teams (CW-FIT; Wills et al., 2009) is an intervention package that can be a part of

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SW-PBIS in classroom settings. Behavioral, Emotional, and Social Training: Competent Learners Achieving School Success (BEST in CLASS; Vo et al., 2012) is a manualized classroom-based intervention as a Tier 2 intervention supporting early childhood teachers' use of effective instructional practices with young, high-risk children (Conroy et al., 2014). It promotes positive teacher–child interactions, enhances child engagement, increases learning opportunities, and decreases the occurrence of problem behaviors (Vo et al., 2012).

However, a comprehensive and systematic teacher training for behavioral problems based on the behavioral and functional approach is not popular in Japan to date. It is necessary to consider the Japanese education system and culture when examining programs based on these behavioral and functional approaches. In Japan, preschool education is divided into kindergarten and nursery schools, which operate under different laws and systems. Kindergartens fall under the authority of the Ministry of Education, Culture, Sports, Science, and Technology, whereas nursery schools fall under the Ministry of Health, Labor and Welfare. Children with disabilities may attend a child development support center, or they may attend both the support center and kindergarten or nursery school. Currently, itinerant consultation is the main system of support for children with disabilities in Japan. Through itinerant consultation, direct support is provided to the child and to the child care workers. However, there is no unified style of itinerant consultation, and various styles are implemented depending on variables related to each local government, preschool, and consultant area of specialization (Gondo, 2006). Despite its limitations as a support system, it is important to investigate the feasibility of a teacher training program based on a behavioral and functional approach to behavioral problems within an itinerant consultation approach (Inoue & Oda, 2020).

In this study, the effects of a Japanese preschool teacher training program based on a behavioral and functional approach were examined in a kindergarten and nursery school. The purpose of this study was to evaluate the effectiveness of this program for homeroom teachers of children in inclusive regular classes who had or were suspected of having developmental disorders. We conducted a group staff training program for teachers working in preschools in Japan, consisting of lectures on behavioral and functional approaches to behavioral problems, individual support plans in group work, and case studies. Research questions regarding the effectiveness of this program were the following:

Research Question 1: Will participating teachers improve their knowledge of behavior analysis?
Research Question 2: Are there any improvements in the targeted problem behaviors and adaptive behaviors for which the support plan was implemented?
Research Question 3: Will untargeted behavioral problems, difficulties, and adaptive behaviors be improved?
Research Question 4: Will the teacher training program result in differentiated teacher and child outcomes across the kindergarten and nursery school settings?
Research Question 5: After 1 year, could a voluntary case-study meeting conducted by only teachers be maintained?

Method

Participants

Twenty-five teachers employed at a private kindergarten and private nursery school (13 at Kindergarten A and 12 at Nursery School B) participated in this study. The two preschools were in the same district and were itinerantly consulted by a supervisor 3 times a year. Six of 13 Kindergarten A teachers and three of 12 Nursery School B teachers had a fourth-year college degree. The other teacher had a junior college degree. No teacher was qualified for special education. The average age was 36 years at Kindergarten A (range = 22–58 years) and 39 at Nursery School B (range = 21–58 years). The average number of years of experience was 13.64 (range = 1–38 years) among both groups of participants. One participant (T3) was not selected due to her managerial position, and she participated only in the workshop lectures.

Each teacher was in charge of an inclusive class, which included children diagnosed with developmental disabilities and those classified as high-risk for disability. Each teacher arbitrarily selected one child with behavioral problems from their classrooms to participate in this study. The total number of children selected was 24 (17 males, seven females), and their average age was 4.04 years (range = 2.05–6.03). The diagnoses were ASD (11), attention-deficit/hyperactivity disorder (ADHD; 1), and the remaining children were at high risk of diagnosis.

The children were measured on the *Kinder Infant Development Scale* (KIDS; Miyake et al., 1989). KIDS is a standardized developmental test in Japan. It is a parental evaluation questionnaire used for screening children from the age of 0 years 1 month to 6 years 11 months. Both parents and teachers can use this instrument. The questionnaire includes 130 "yes" or "no" questions that should be answered by someone (parent or teacher) familiar with the child's behavior. Based on the answers provided, it is possible to determine the developmental age for the categories "exercise," "operation," "language understanding," "language expression," "concept," "sociability toward children," "sociability toward adults," and "discipline." KIDS is used to calculate the child's overall developmental quotient (DQ). The demographic details of the teachers and children are shown in Table 1.

Table 1. Demographic Data for Teachers and Children.

Teachers				Children				
ID	Age (years)	Gender	Years of experience	ID	Age (months)	Gender	Diagnosis	DQ
T1	45	Female	21	C1	29	Male		80
T2	30	Female	8	C2	34	Female	ASD	95
T3[a]	58	Female	36					
T4	35	Male	4	C3	39	Male		102
T5	22	Female	2	C4	51	Female	ASD	112
T6	40	Female	18	C5	48	Female		89
T7	28	Female	6	C6	49	Male	ASD	98
T8	28	Female	6	C7	50	Male	ADHD	78
T9	25	Male	3	C8	62	Male		82
T10	42	Female	10	C9	58	Female		80
T11	33	Female	11	C10	61	Male		99
T12	46	Female	24	C11	72	Male		110
T13	36	Female	18	C12	75	Male	ASD	120
T14	37	Female	16	C13	29	Male		92
T15	41	Female	20	C14	34	Male		98
T16	46	Female	25	C15	38	Male	ASD	68
T17	36	Female	15	C16	39	Female		88
T18	57	Female	17	C17	44	Male	ASD	64
T19	38	Female	8	C18	50	Male		96
T20	30	Female	5	C19	63	Female	ASD	76
T21	33	Female	13	C20	59	Male		102
T22	21	Female	1	C21	53	Male	ASD	82
T23	30	Female	9	C22	75	Male	ASD	68
T24	58	Female	25	C23	73	Male	ASD	77
T25	41	Female	20	C24	71	Male	ASD	65

Note. ASD = autism spectrum d; ADHD = attention-deficit/hyperactivity disorder; DQ = developmental quotient (KIDS).
[a]Teacher 3 was not assigned because she was a manager.

Group Staff Training Program

The staff training team included a clinical psychologist and three clinical psychology postgraduate students. The second author presented a lecture, and the postgraduate students assisted with the group work. The program comprised a total of 10 sessions, divided into six training sessions and four case-study meetings. The case-study meetings were intended to continue after training as regular meetings. Each training session was held for 2 hr every other week and included a lecture and group work about behavior modification and the functional approach. Strategy sheets (Inoue, 2007) were used in the group work and case-study meetings. The strategy sheet is a simple support plan to facilitate environmental adjustments and establish appropriate behavior. The sheet is A4 size and is divided into upper and lower rows. The upper row is designed to enable the functional assessment of one problem behavior and is completed based on a functional assessment interview (O'Neill et al., 1996). Three frames are provided to enter A (Antecedent), B (Behavior), and C (Consequence) and the estimated functions (e.g., attention, demand, escape/avoidance, and sensory).

The lower portion of the sheet provides a space for the support plan. It includes three columns to be completed with the following information during the group work discussion: environmental adjustments that prevent problem behavior from occurring, alternative appropriate behaviors for problem behavior, and reinforcement of the appropriate behaviors and responses to the occurrence of problem behavior.

Table 2 shows an overview of all training sessions. The objectives of the training sessions were (a) to acquire knowledge about behavioral modifications, (b) to apply the knowledge acquired at lectures to actual child care (teacher behavior changes/environment changes), (c) to change the behavior of the children, (d) to assess functional assessment and implement support plans based on the strategy sheets for problem behavior, and (e) to enable the case-study meetings. The first half of each session was a lecture, and the second half consisted of group work. The first lecture addressed the characteristics of developmental

Table 2. Outline of the Teacher Training Program.

Session	Lecture content	Group work
1	Characteristics of developmental disorders A-B-C analysis Defining target behavior	A-B-C analysis[a] Write and discuss on the A-B-C analysis chart based on the illustrated sample cases Defining target behavior Rewrite the illustrated abstract description (e.g., tantrum) into a concrete description (e.g., hit her/his own head) Defining target behaviors of own student
2	Reinforcement of appropriate behavior Positive and negative reinforcement, selecting the appropriate reinforcer, token economy system, Differential reinforcement of other behavior (DRO) Explanation of behavior recording sheet	Reinforcement of appropriate behavior Find and discussion adaptive behaviors other than challenging behaviors by looking at illustrations Practice of behavior recording Show a video of "escape behavior" and record the frequency on a recording sheet
3	Antecedent intervention Remove of negative stimuli, use visual prompt, indicate the schedule, lower the request level, use the interested stimulus, behavioral contract, make an opportunity for choice	Discussion of antecedent intervention Discuss ideas about antecedent intervention based on sample case Planning on the strategy sheets Fill out an "A-B-C analysis" and "Antecedent Strategy" about target behaviors using a strategy sheet.
4	Teaching appropriate behavior (1) Task analysis Prompting and Fading "Planning sheet" for adaptive behavior	Practice of task analysis Task analysis based on sample case (e.g., putting on pants) Planning on the strategy sheets Fill out an "Adaptive Behavior," "Consequence Strategy," and "Prompting for Adaptive Behavior or Cooling Down" about target behaviors using a strategy sheet
5	Intervention based on functional assessment of challenging behavior Demand/attention, avoidance/refusal, sensory	Planning on the strategy sheets Discuss based on the results and recording sheet of the implementation and revise their strategy sheet.
6	Teaching appropriate behavior (2) Social skill training, social story	Planning on the strategy sheets Discuss based on the results and recording sheet of the implementation and revise their strategy sheet.
7–10	Case-study meeting	Presentation of case studies based on strategy sheets and recording sheets All members provide ideas according to the contents of the strategy sheets

[a]A-B-C analysis is a descriptive assessment conducted as an initial part of a complete functional behavior assessment.

disorders, and the second and subsequent lectures covered knowledge of behavioral modification based on applied behavior analysis. The sixth lecture addressed social skills.

During the group work sessions, we created a "strategy sheet" for the children's problem behaviors. In the first group work session, we asked the teachers to list the children's most worrisome current behaviors. We narrowed down the list of behaviors by discussing with the teacher which behaviors were concrete and easy to record and for which progress could be achieved in a short period. In the second group work session, teachers received advice on how to praise appropriate behaviors and record target behaviors efficiently using the recording sheets. Trained staff advised and modified the recording sheets prepared by each teacher according to the target behavior. Each teacher practiced recording the target behavior from that point until the third group work session. In the third group work session, teachers discussed ideas about antecedent interventions based on sample cases. The functional assessment interview was conducted by the members of the group. They filled out an "A-B-C analysis" and "Antecedent Strategy" about target behaviors of their students using a strategy sheet. From the end of Session 3, the teachers implemented interventions and recorded target behaviors. In the fourth group work session, teachers practiced task analysis based on sample cases. They filled out "Alternative Behavior," "Consequence Strategy," and "Prompting for Alternative Behavior or Cooling Down" strategy sheet about challenging behaviors of their students.

This support plan was implemented, and the next sheets were created only once the recorded goal was achieved. Goal mastery criteria depended on the individual's target behavior, but when the target behavior did not occur for more than 1 week or the occurrence was less than 20%, the decision as to whether it was resolved was made by teachers and staff. If the teacher aimed to acquire adaptive behavior, the goal mastery criteria were set at 80% or higher. If the mastery criteria were reached, the teacher moved on to the next target.

The last four training sessions were case-study meetings. The author facilitated the first session and instructed the teachers on how to proceed with a case-study meeting. In each of the three subsequent meetings, a facilitator and a case presenter were chosen among the participants. The case presenter made a presentation based on a strategy sheet and record sheet. Then, all members provided ideas according to the contents of the strategy sheets. For details on the training curriculum, PowerPoint materials, and strategy sheets, see Inoue's (2020) website.

Measurements

Applied Behavior Analysis Checklist for Teachers (ABACT; Koseki et al., 2010). The ABACT is a 25-item checklist that is used as an indicator of effectiveness when conducting workshops on applied behavior analysis. This questionnaire allows the user to select an answer from four options to measure knowledge of applied behavior analysis. Each correct answer is awarded one point, with a maximum of 25 points. This checklist is designed for teachers and the results can assist them in troubleshooting school situations. The ABACT can measure changes in knowledge about behavioral analysis and behavioral therapy. We conducted the ABACT before staff training (pre), after the sixth session (Post 1), and after the final case-study meeting (Post 2).

Strengths and Difficulties Questionnaire (SDQ; Goodman 1997, 2001). We asked participants to complete the SDQ for their child before staff training (pre) and after the sixth session (Post 1). The SDQ was developed from the Goodman Questionnaire for behavioral screening for 3- to 16-year-olds. It consists of 25 items that are divided into five scales of five items: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behavior. Each of the 25 items is rated as *not true* (0 points), *somewhat true* (1 point), or *certainly true* (2 points). According to Matsuishi et al. (2008), the clinical range is indicated by a rating of five points or more for emotional problems, five points or more for behavioral problems, seven points or more for hyperactivity, five points or more for peer problems, and four points or less for prosocial behavior.

Children's Behavior Checklist (Hongo et al., 2005). We assessed overall child behavior changes other than target behavior before staff training (pre) and after the sixth session (Post 1). The participants installed a video camera at the back of the classroom and recorded each of the following four situations for 20 min: "morning party," "lunchtime," "free play," and "activities with rules." A total of eight scenes, which included the pre- and postvideos for each of the four scenes, were scored by two evaluators using the "Children's Behavior Checklist" (Hongo et al., 2005). This checklist consists of 60 items divided into five categories ("relationship with adults," "relationship with children," "group activities," "play and life activity," and "other situations") that included 12 items each. Each item was evaluated on a 5-point Likert-type scale. Scoring was divided into the abovementioned five categories and five factors ("trouble with people," "restlessness," "lack of adaptability," "rule violation," and "impulsiveness"). The two evaluators were PhD students who did not participate in this research and were trained by the researchers on the evaluation method.

For interobserver agreement, the evaluators were two graduate students specializing in developmental disorders with a specialization in clinical psychology and who did not participate in the study. They had 2 years of experience in behavioral analysis and the training of children with developmental disorders. The evaluators were briefed by the second author on the evaluation method. They were not informed about which data were pre or post, and they performed the assessment independently. The rate of concordance between the evaluators was 97.5% for 33.3% of the video data for all subjects.

Social acceptability and 1-year later survey. After the training program concluded, teachers responded to a 12-item social acceptability questionnaire to indicate whether they found the staff training program useful and whether it was easy to implement. The questionnaire consisted of Likert-type items rated on a 5-point scale (1 = *not true* to 5 = *very true*). One year after the program, the two schools were sent free-form questionnaires about the maintenance of this training program.

Statistical Analysis

Statistical analyses were performed by using the SPSS statistical package, version 20.0. For the descriptive study, the quantitative variables were expressed as the average of their standard deviations. Comparisons between the averages were made using a one-way analysis of variance and student's t test. All of the p values $< .05$, which were two-sided, were considered significant.

Results

The attendance rate for all 10 sessions at both facilities was 100%. The tasks scheduled for each session, including

reviewing the recording sheet and strategy sheet, were completed by all participants.

Identification and Achievement of Target Behavior

Table 3 shows the problem behaviors selected by the teachers, the estimated functions, the alternative adaptive behaviors, and the techniques used in the intervention. The target behaviors selected by the teachers were most likely aimed at managing the "escape behavior" exhibited during group activities (e.g., leaving the classroom during reading time), followed by "refusal behavior" exhibited during activities of daily life (e.g., not going to the toilet and crying). Eight teachers selected target behaviors that were not aimed at providing alternative behaviors for problem behaviors but rather at acquiring independent or spontaneous behaviors. In that case, the goal was to enable the child to act without being prompted (e.g., putting on one's shoes independently). The 16 participants identified problem behaviors based on a functional assessment. A functional assessment interview was conducted on the selected problem behavior. The most common result was the escape/avoidance function at 50%, whereas the attention functions were 37.4%, demand functions were 6.3%, and sensory functions were 6.3%. Two of 16 teachers set functionally equivalent behaviors as alternative behaviors. T19 selected "moving hand in hand with a friend" as a functionally equivalent and alternative adaptive behavior to the "escaping during outside activity" behavior, which was estimated to match the attention function of C18. Similarly, T21 selected "high five with the teacher when arriving" as a functionally equivalent and alternative adaptive behavior to the "escaping outside the school building when arriving at school" behavior of the C20 student. The remaining 13 chose the behavior to follow the instructions using prompts and the token economy system. No teacher chose restraining techniques, punishment, or negative reinforcement. Teachers elected to use prompts to promote adaptive behaviors in place of environmental adjustments. If the target behavior could not be resolved by the next meeting, a new strategy sheet was not created, and the revision was continued. When the behavior was resolved, we moved to the next target behavior and created a new strategy sheet. On average, 2.4 strategy sheets were created by each teacher from Session 4 to Session 6. Two cases were considered during each case-study meeting. A total of 16 cases were considered for the two schools.

ABACT

First, we examined whether there was a difference in the total average score of the pretests of the ABACT between Kindergarten A and Nursery School B. The difference between the averages was −2.28 (95% confidence interval [CI] = [−4.93, 0.38]), and no significant difference was observed, $t(23) = -1.776$, $p > .05$. Therefore, the scores of both schools were combined, and one-way analysis of variance was performed for the three periods of pretest, Post 1, and Post 2. Therefore, there was a significant difference obtained at the 5% level, $F(2.72) = 10.38$, $p < .05$. When multiple comparisons were performed by the Tukey method, a significant difference was found at the 5% level between pretest and Posttest 1 and between pretest and Posttest 2 (see Table 4).

SDQ

We examined whether there was a difference in the total average score of the SDQ pretests between Kindergarten A and Nursery School B. The difference between the averages was −1.25 (95% CI = [−3.46, 0.96]), and no significant difference was observed, $t(22) = -1.174$, $p > .05$. Therefore, the scores of both schools were combined, and we examined whether there was a difference in each subscale between the pretest and the posttest. Significant differences were observed in all subscales other than emotional symptoms: conduct problems, $t(23) = 4.097$, $p < .001$, $d = 0.74$; hyperactivity/inattention, $t(23) = 6.858$, $p < .001$, $d = 1.31$; peer relationship problems, $t(23) = 4.742$, $p < .001$, $d = 1.05$; prosocial behavior, $t(23) = -5.753$, $p < .001$, $d = 0.96$; and difficulty total, $t(24) = 7.044$, $p < .001$, $d = 1.05$.

Children's Behavior Checklist

Table 3 shows the results of the Children's Behavior Checklist. No significant difference was observed in the average score of each subscale of the pretests of Kindergarten A and Nursery School B. Therefore, the scores of both sets of data were combined, and we examined whether there was a difference in each subscale between pretest and posttest. There was a significant difference found at the 5% level between group activity, $t(21) = 2.361$, $p < .005$, $d = 0.70$, and impulsiveness, $t(21) = 3.205$, $p < .005$, $d = 0.79$. Differences at the 1% level were observed in the categories of relationship with adult, $t(21) = 5.022$, $p < .001$, $d = 1.51$; relationship with children, $t(21) = 5.923$, $p < .001$, $d = 1.30$; daily life and play activities, $t(21) = 4.559$, $p < .001$, $d = 0.70$; other situations, $t(21) = 3.628$, $p < .001$, $d = 0.62$; trouble with people, $t(21) = 6.346$, $p < .001$, $d = 1.31$; restlessness, $t(21) = 4.87$, $p < .001$, $d = 1.04$; lack of adaptability, $t(21) = 3.793$, $p < .001$, $d = 0.63$; and rule violation, $t(21) = 4.895$, $p < .001$, $d = 1.19$.

Social Acceptability Questionnaire

Participants were satisfied with the overall program, and they assigned a high score to the statement, "I could

Table 3. Participant-Selected Problem Behaviors, Functions, Target Behaviors, and Intervention Techniques.

ID	Difficulty or problem behavior	Function	Target behavior (adaptive behavior)	Intervention
C1	Escaping during meal time	Escape	Sit down and eat during meal time	Using timer, Token economy
C2	Making noise during meal time	Attention	Eat without noise during meal time	Using timer, Token economy
C3	Difficulty in putting shoes on		Put on shoes properly	Using visual prompt, Prompt and fading
C4	Difficulty in brushing teeth		Brush teeth	Using visual prompt card, Prompt and fading
C5	Playing with toy when cleaning up	Escape	Put the toys in the right place	Using visual prompt card
C6	Playing with toy when cleaning up	Escape	Put the toys in the right place	Using visual prompt card
C7	Screaming during the task	Attention	Speak with "Level 2" voice during study time	Using visual prompt card
C8	Difficulty in preparing for the morning meeting		Prepare for the morning meeting without instruction	Using schedule card
C9	Freezing during conversation		Communicate with communication cards	Using communication cards
C10	Refusing to go to the bathroom	Escape	Go to the bathroom	Using visual prompt, Token economy
C11	Biting nails	Sensory	Engage in tasks without biting nails	Social story, Using visual prompt
C12	Screaming during the activities	Attention	Speak at a volume that suits locations	Using visual prompt card, Token economy
C13	Difficulty in putting shoes on		Put on shoes properly	Using visual prompt, Prompt and fading
C14	Escaping during the time to change clothes	Escape	Change clothes	Using visual prompt, Token economy
C15	Refusing to go to the bathroom	Escape	Go to the bathroom	Using visual prompt and timer, Token economy
C16	Throwing shoes at the front door	Escape	Put shoes in the shoe box	Using visual prompt, Token economy
C17	Continuing playing even after the play time is over	Demand	Coming back to the classroom when the play is over	Using timer, Token economy
C18	Escaping during outside activities	Attention	Move hand in hand with friends	Using behavioral contract card, Token economy
C19	Escaping during reading time	Escape	Sit down and participate in the book reading	Using behavioral contract card, Token economy
C20	Escaping outside the school building when arriving at school	Attention	High five with the teacher when arriving	Social story
C21	Difficulty in using a spoon		Use a spoon properly	Prompt and fading
C22	Difficulty in putting shoes on		Put on shoes properly	Using visual prompt, Prompt and fading
C23	Refusing to eat without help	Attention	Eat with chopsticks without helping	Prompt and fading, Token economy
C24	Difficulty in putting shoes on		Put on shoes properly	Prompt and fading

Table 4. Pre- and Postchanges Across Time and Measures.

Mesurements	*n*	Subcategories	Pre	Post 1	Post 2					
			M (*SD*)	*M* (*SD*)	*M* (*SD*)	*t* value	*p*	Cohen's *d*	*F*	Multiple comparisons
ABACL	25		18.40 (3.34)	21.16 (2.10)	21.44 (2.20)		00		10.38	Pre < Post 1, Pre < Post 2
SDQ	24	Conduct problems	4.71 (2.63)	3.04 (1.78)		4.10	.00	0.74		
		Hyperactivity/inattention	6.67 (2.60)	3.75 (1.73)		6.86	.00	1.31		
		Emotional symptoms	3.17 (2.06)	2.06 (1.78)		1.43	.17	0.50		
		Peer relationship problems	3.21 (1.59)	1.92 (0.72)		4.74	.00	1.05		
		Prosocial behavior	3.08 (1.79)	4.96 (2.12)		−5.75	.00	0.96		
		Difficulty total	17.75 (5.87)	11.58 (3.71)		7.36	.00	1.05		
Children's Behavior Checklist	24	Relationships with adult	2.70 (0.81)	1.55 (0.71)		5.02	.00	1.51		
		Relationships with children	2.68 (0.93)	1.63 (0.80)		5.92	.00	1.30		
		Group activities	2.98 (1.06)	2.22 (1.10)		2.36	.03	0.70		
		Daily life and play activities	2.60 (1.05)	1.83 (1.16)		4.56	.00	0.70		
		Other situations	2.24 (0.94)	1.65 (0.95)		3.63	.00	0.62		
		Trouble with people	3.08 (0.91)	1.81 (1.02)		6.35	.00	1.31		
		Restlessness	3.36 (1.65)	1.84 (1.24)		4.87	.00	1.04		
		Lack of adaptability	2.92 (1.16)	2.15 (1.27)		3.79	.00	0.63		
		Rule violation	3.34 (0.76)	2.23 (1.08)		4.90	.00	1.19		
		Impulsiveness	3.02 (1.03)	2.19 (1.08)		3.21	.00	0.79		

Note. ABACL = Applied Behavior Analysis Checklist for Teachers; SDQ = Strengths and Difficulties Questionnaire.

Table 5. Social Acceptability Ratings.

Item	*M*	*SD*
Making a strategy sheet was easy	3.88	0.82
I could understand the relationship between child behavior and environment	4.92	0.27
I was able to feel the change in behavior of the children	4.40	0.57
The program has given me confidence of support for challenging behavior in the future	3.52	0.64
Other teachers' opinions were helpful	4.96	0.20
Case-study meeting was helpful	4.96	0.20
Case study led to changes in own behavior	4.08	0.63
By holding a case-study meeting, I came to be more creative than before	4.24	0.65
Case-study meeting with all members in school led to cooperation with other staff members	4.68	0.55
I want to continue the case-study meetings in the future	4.68	0.47
I am confident that I could hold a case-study meeting without supervision	3.64	0.74
Evaluation throughout the program	4.96	0.20

understand the relationship between child behavior and environment," which was the main topic of the lecture. The case-study meetings held late in the program showed high confidence and satisfaction. The participants also expressed their desire to continue conducting the case-study meetings (see Table 5).

Changes in Both Schools After the Program

One year after the program, both schools were given a free-form questionnaire. At Kindergarten A, it was reported that the employment of a simple weekly 30-min case-study meeting using a strategy sheet was maintained at the school level. One participant stated that before the workshop,

> It was more common to focus on only the problem behavior, and only the homeroom teacher would consider how to stop it; but after the training, all staff members learned about functional assessment and the strategy sheet has made it easier for teachers to advise each other.

In addition, some teachers began to use the strategy sheet during their meetings with the students' parents. In Nursery School B, before the workshop, the staff who needed advice often consulted with the director rather than with the other staff members; however, after the workshop, all staff members created a strategy sheet when they encountered trouble with a child's behavior. One year later, they maintained the use of the strategy sheet for regular staff meetings at the school.

Discussion

We conducted a school-wide training for Japanese preschool teachers based on the behavioral and functional approach to children with problem behaviors. Twenty-five Japanese teachers at a kindergarten and nursery school participated in the program for six training sessions and four case-study meetings. The training sessions consisted of lectures on behavioral and functional approaches and individuals' support plans in group work. The results showed improvements in both the staff's knowledge of applied behavior analysis and the children's behaviors targeted in the training plans. In addition, the overall behaviors of the children improved, and the postprogram questionnaire showed that participants' satisfaction and acceptability were high. One year later, a case-study meeting had been maintained weekly at both schools.

The first six sessions of this program were training sessions consisting of lectures and group work. The lecture contents addressed topics such as characteristics of developmental disorders, functional assessment, and behavior modification. The mean scores of ABACT before the program (pre), after the training session (Post 1), and after the case-study meeting (Post 2) were significantly different between pre and Post 1 and between pre and Post 2. This indicates that the lectures and group work in the training session were effective in imparting knowledge of applied behavior analysis to the participants and that the knowledge was maintained.

The targeted problem behaviors and adaptive behaviors in the support plans improved for 24 teachers. Grey et al. (2007) commented that knowledge alone was insufficient to change the staff's behavioral response. Some previous studies indicated that performance-based feedback/coaching with teachers that included direct training procedures involving modeling, rehearsal, and feedback led to higher intervention fidelity (Lewis & Newcomer, 2002; Reinke et al., 2007).

The group training program in this study consisted of behavior change knowledge, personalized support planning, and case studies and did not directly intervene in teachers' behaviors. Nevertheless, various hypotheses can be made about improvements in children's behaviors. One

hypothesis is that this may have been due to the active use of physical environmental changes and supporting tools such as using tables of schedules, tokens, and timers rather than relying on teacher performance such as adjusting the timing of praise and instructions. However, this will require further comparative analysis in the future.

In contrast, a few teachers chose behaviors that were functionally equivalent to problem behaviors as alternative behaviors, and no teacher chose alternative communication behaviors. The tendency to choose behaviors that followed instructions as alternative behaviors to problem behaviors may be characteristic of Japanese teachers. In the future, it will be necessary to develop a further step for teachers to emphasize communication that replaces the needs of children, such as functional communication training (Carr & Durand, 1985).

To assess overall behavioral changes, four scenes were recorded using cameras installed in classrooms and were evaluated using the Children's Behavior Checklist. The results showed a statistically significant improvement in behavior for all subscales before and after the training session, including interpersonal relationships. Also, the SDQ showed an improvement for all subscales except "emotional symptoms." Together, these measures show improvement in child behavior other than the target behavior of the strategy sheet.

A possible hypothesis concerns the impact of a case-study meeting. The results of the teacher's social acceptability questionnaire also showed high satisfaction with the case-study meeting. This high satisfaction may also be related to the fact that case-study meetings using strategy seats were maintained even after a year. Although the results may vary from country to country, research on Japanese child care staff has shown that a positive perception of meetings in the workplace contributes to high self-efficacy and reduced stress (Oouchi et al., 2018). Therefore, the format of case-study meetings in this study may help to reduce teacher stress.

In this study, in addition to lectures on knowledge acquisition, participants used a strategy sheet, which is a tool based on behavioral and functional approaches for their child's behavior, and formulated an intervention plan during group work. The teachers implemented their intervention plan in their schools between one session and the next one. Establishing Plan, Do, Check, and Act (PDCA) cycles of support for children is important as a technique of organizational behavior management (Sasaki & Noro, 2017). It is thought that the group work in this study was effective in establishing such a PDCA cycle in the practice of the teacher group throughout the entire school. To draw conclusions on the impact of each program component, future research should conduct intergroup comparison designs to manipulate the three independent variables: lectures, group work, and case-study meetings.

Limitations and Future Research

This study has several methodological limitations; thus, the findings should be viewed with caution. First, we used a pre–post study design. Without a comparison group, we cannot discuss the efficacy of this program. It is necessary to set up a delayed intervention group to prove more clearly the effect of the intervention. Second, the fidelity of the behavior support plan implementation was not measured. Future research should objectively show the behavioral changes of both teachers and children. Third, it was not possible to clarify the impact of the participants' educational background and experience with special education on the effectiveness of the program. In addition, the anxiety and stress of each teacher may affect the effectiveness of the program. Future studies with larger samples are needed to address these issues.

This study conducted school-wide staff training at two different preschools in Japan. Although the two schools operate under different systems, there was little difference in the teachers' age, years of experience, and prior ABACT scores, and the effects of the program were similar for both schools. This suggests that the school-wide group staff training conducted in this study is also effective in schools with different systems. In addition, the intervention method of this program may fit the contextual standard preschool support in Japan, which involves itinerant consultations several times a year. Future studies should increase the number of target schools to further test this finding.

In summary, this study reports initial findings on the group teacher training based on the behavioral and functional approach for Japanese preschool teachers. Improvements were reported for both the teachers' knowledge of applied behavior analysis and the children's behaviors targeted in the training plans. Teachers also found this training program to be acceptable. In addition, a 1-year follow-up found that the general procedures related to assessment, plan development, and implementation continued in the two schools. To disseminate behavioral and functional interventions in different countries, institutions, and cultures, it will be necessary to initially prioritize interventions that consider the specific contexts (Albin et al., 1996). Although these findings suggest that the program implemented in the schools was successful, additional research needs to be conducted to determine its efficacy.

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