

Original article

## Short-term effect of American summer treatment program for Japanese children with attention deficit hyperactivity disorder

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### Abstract

We reported the results of the 3-week summer treatment program (STP) for children with attention deficit hyperactivity disorder (ADHD) in 2006. The STP was based on methods established by Professor Pelham in Buffalo, NY and has been used in a number of studies and at a number of sites in the U.S. This is the first STP outside North America. Thirty-six children age 6–12 years with ADHD participated. The collection of evidence-based behavioral modification techniques that comprises the STP's behavioral program (e.g., point system, daily report card, positive reinforcement, time out) was used. Most children showed positive behavioral changes in multiple domains of functioning, demonstrated by significant improvement in points earned daily, which reflect behavior frequencies. Only one child with ADHD co-morbid with pervasive developmental disorder required an individualized program for excessive time outs. The ADHD rating scale, symptoms of oppositional defiant disorder, and hyperactivity/inattention in Strength and Difficulties Questionnaires evaluated by parents significantly improved after STP. Although the 3-week STP was much shorter than most STPs run in the U.S., the program is more intensive than typical outpatient treatment, providing 105 h of intervention in 3 weeks. The short-term effect of the STP was demonstrated for Japanese children with ADHD.

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### 1. Introduction

Treatment of attention deficit hyperactivity disorder (ADHD) in children has become a national priority in Japan [1]. Particularly, the management of behavioral problems in children with ADHD is a significant issue for teachers and health professionals in Japan. It is clear from a great deal of research that there are three evi-

dence-based short-term treatments for ADHD—medication with a CNS stimulant, behavior modification, and the combination of the two [2,3]. In the U.S. there is widespread agreement that multimodal treatment is best for many if not most ADHD children. However, providing comprehensive treatment for such children is difficult in the Japanese hospital setting. This is largely due to the shortage of specialists who are trained in the provision of evidence-based psychosocial treatments, and the lack of communication between the fields of medicine, psychology, and education. Miyamoto recently administered a questionnaire survey to 486

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parents who have children with ADHD [4]. Thirty-one percent of the parents who responded were not satisfied with medical service, because treatment was mainly medication and evidence-based psychosocial treatments were not commonly provided. This finding regarding parental preference for psychosocial or combined treatment is common among parents in the U.S. [5]. Clearly, we need to establish comprehensive approaches to intervention for ADHD in Japan.

A recent review of psychosocial treatments for ADHD has concluded that there is substantial support for three behavioral approaches to ADHD—parent training, school intervention, and child-focused interventions [3]. With respect to the latter, the only evidence-based, child-focused approach is intensive summer programs focused on peer relationships. The STP was developed to treat ADHD children's difficulties in peer relationships in an intensive summer experience that focuses on learning sports skills and social skills, improving follow-through with adult requests and commands, as well as improving academic achievement. The American STP usually last for 5–8 weeks [6].

The effectiveness of the STP has been documented in multiple studies in North America over the past decade [6–12]. These studies have documented substantial improvements in multiple domains of functioning, including peer relationships, compliance with adult requests, and classroom functioning, as assessed through direct observations and rating scales. Positive effects have been demonstrated in multiple geographic regions of the U.S. and Canada, and with multiple subject populations reflecting a variety of socioeconomic classes and ethnicities. However, there has never been an STP conducted with a primarily Asian sample.

In this paper, we report the results of the first Summer Treatment Program (STP) outside North America for children with ADHD. We established an STP in 2005 with the assistance of two STP specialists from Buffalo (EMG, ARG). This STP lasted 2 weeks and generated positive evaluations by staff and parents [13]. The staff members felt that even the 2-week STP dramatically improved the behavior of the 22 participants. However, consistent with results from U.S. studies, we concluded that 2 weeks was not long enough for several children. The purpose of this study was to evaluate whether a 3-week version of the American STP was effective with Japanese children with ADHD.

## 2. Patients and methods

Thirty-six Japanese children (Age 6–12 y, male:female 32:4) in and around Kurume City participated. Thirty children had ADHD, and six children had a diagnosis of ADHD co-morbid with high functioning pervasive developmental disorder (HFPDD). Among the 30 children with ADHD, 24 were combined type and 6

were predominantly inattentive type. The children were divided into three groups by age with 12 in each group; Group A (6–9 y, 6 had ADHD and 6 had ADHD co-morbid with HFPDD), Group B (8–10 y, all had ADHD), Group C (10–12 y, all had ADHD). Nineteen children had participated in the 2005 STP (5 in Group A, 7 in Group B, 7 in Group C). All parents were Japanese except for two children with American and British fathers, respectively. All the participants were diagnosed with ADHD according to DSM-IV criteria by pediatric neurologists either at Kurume University Hospital or St. Mary's Hospital and their IQs were all above 70. Thirteen children had co-morbid oppositional defiant disorder, but none had conduct disorder.

The staff consisted of 40 members: 9 clinical psychologists; 21 student counselors from the Department of Psychology, Kurume University; 1 pediatrician from the Department of Pediatrics & Child Health, Kurume University; 7 special education teachers in Kurume City; and 2 part-time consultants (EMG and ARG) from the State University of New York at Buffalo. The first author (YY) studied STP in Buffalo for 5 weeks in 2003 [14].

Training for STP staff has been well specified and documented [6]. After an introductory lecture by the first author, intensive training for student counselors was provided every weekend for 3 months before STP by the clinical psychologists (lead counselors), who had been trained by Buffalo staff and had participated in the first STP in 2005. The teachers had six training sessions by the special education teacher who had participated in the STP in 2005. The STP was run at Kanamaru municipal elementary school with the assistance of Board of Education in Kurume City. This study protocol was approved by the Ethical Committee of Kurume University and the written informed consent was obtained from the parents and the children.

### 2.1. Procedures and techniques used in the STP

The STP procedures include a variety of behavioral components that have been extensively described and documented elsewhere [6,15]. A few minor modifications from the original program manual due to the cultural difference were made in consultation with Buffalo STP specialists. Children attended the STP from 9:30 AM to 4:35 PM on weekdays for 3 weeks. Children were placed in three age-matched groups of 12 that stayed together throughout the day. The children with symptoms with HFPDD were all in the youngest group. Each group spent 1 h daily in classroom sessions conducted by special education teachers, during which individualized paper and pencil and computer-assisted learning was provided. The remainder of each group's day consisted of recreationally based group activities, supervised by a team of 6–8 counselors. The intervention was implemented across classroom and recreational settings while children were

Table 1  
Summer treatment program: a typical day.

Time	Activity
9:30–10:00	Arrivals
10:00–10:15	Morning discussion
10:15–10:25	Transition/bathroom
10:25–11:25	Sports skills training (Soccer)
11:25–11:35	Transition/bathroom
11:35–12:35	Academic learning center
12:35–12:45	Transition/bathroom
12:45–13:05	Lunch
13:05–13:20	Lunchtime recess
13:20–13:30	Transition/bathroom
13:30–14:30	Designated game (Soccer)
14:30–14:40	Transition/bathroom
14:40–15:40	Swimming
15:40–15:50	Transition/bathroom
15:50–16:05	End of day recess
16:05–16:30	Departure

engaged in classroom tasks and group-based recreation. The typical STP schedule is shown in Table 1. Sixteen children remained on their currently-prescribed medication (short-acting methylphenidate) during the STP. Compliance with medication dosing in the morning and at lunch was strictly checked by the medical staff.

### 2.1.1. Intervention Components

**2.1.1.1. Point system.** In a systemic reward/response-cost program, children earned points for appropriate behavior (e.g., helping, compliance, good sportsmanship) and lost points for inappropriate behavior (e.g., teasing, noncompliance, rule violations) throughout the day. The points children earned were exchanged for privileges (e.g., weekly field trips on Friday) and social honors. Counselors recorded points taken from and awarded to each child throughout the day. Staff members received extensive training in the point system, and the reliability of the point system and frequency counts has been well documented [6,11]. Before the program began, children received a booklet that described the point system and each mother was asked to explain the point system to her child. On the first day of the STP, lead counselors explained the point system and activity rules to the children. Staff members reviewed activity rules prior to each activity, and during the activities gave specific behavioral feedback and instructions to the children in addition to informing them of points earned and lost whenever they exhibited behaviors included in the point system. Children were disciplined for prohibited behaviors (i.e., intentional aggression, intentional destruction of property, repeated noncompliance), with discipline taking the form of loss of privileges or time out from the ongoing activities.

**2.1.1.2. Daily Report Card.** Daily report cards (DRCs) were implemented for the children in STP. DRCs included individualized target behaviors from the class-

rooms and from the recreational activities. We provided standardized DRC in the first week, and the three target behaviors and criteria for meeting daily goals were individually revised in an ongoing manner in the second and third week. Parents provided positive reinforcements at home to reward children for reaching daily goals.

**2.1.1.3. Sports skills and social skills training.** Children received intensive coaching and practice in sports participation and skills. One hour daily was devoted to small-group skills training either soccer or kick baseball and an additional hour was devoted to playing the same sports game. One hour was spent in swimming instruction. The emphasis was on teaching skills and sports rules because many children with ADHD are not fully aware of sports rules and do not have well developed sports skills and coordination. The instruction was reinforced through the point system. When children violated sports rules, counselors informed them of point losses in addition to providing corrective feedback and instruction. In addition, children's attention to the game and knowledge of game were assessed by asking each child 'attention questions' during each game period. Children earned points when they answered questions correctly. Social skills training was provided in brief, daily group sessions that included instruction, modeling, role-playing, and practice in key social concepts such as "good communication".

**2.1.1.4. Learning Center.** Children spent 1 h daily in Learning Center: 30 min in an academic class and 30 min in a computer-assisted-instructional classroom. Behavior in the classrooms was managed with a simplified point system that included both reward (earning points for work completion and accuracy) and response-cost (losing points for violating classroom rules) components. Children received academic assignments that were individualized according to each child's needs, usually including reading, spelling Kanji (Chinese characters), and arithmetic problems.

**2.1.1.5. Parent training.** Parents participated in two sessions before the beginning of the STP in which they learned general behavioral principles such as reinforcement systems, appropriate commands, and time out, and were taught to implement home-based rewards for children's performance during STP day as measured by the DRC. A weekly parent meeting with lead counselors and developmental specialists was provided at night to discuss children's individual problems during the STP.

### 2.1.2. Dependent Measures

Behavioral data were based on frequency counts of the behaviors described in the point system in the recreational and learning center settings. These included individual points taken from or awarded to children, number of time outs, and rule violations. Behaviors were

recorded by counselors and teachers, collected by the data manager, and input into a computer spreadsheet at the end of the day. Thus, daily behavioral data were available to lead counselors and developmental specialists to monitor children's progress and revise treatment programs as necessary. A composite dependent measure was constructed across settings (recreation and classroom), valence of behavior (negative and positive behaviors), and specific categories (peer relations, compliance, academic work completion) by computing the net total of points (points earned minus points lost) for each child for each day.

Parents completed a questionnaire on ADHD, oppositional defiant disorder (ODD), and conduct disorder rating scale based on DSM-IV criteria, and the Strengths and Difficulties Questionnaire (SDQ) [16] 2 weeks before the STP and 1 week after the STP. Parent satisfaction questionnaires [6,11] were mailed to parents 1 week and 4 months after the STP. These ratings ranged from 1 (very much unsatisfied) to 5 (very much satisfied).

Analysis of variance (ANOVA) was used for the analysis of each point system-related efficacy measure. Paired *t*-tests were performed for the comparison of rating scales before and after STP. All statistical tests were performed at  $p = 0.05$  significance level.

### 3. Results

#### 3.1. Group results

None of the 36 children dropped out during the 3-week STP. Most of the children showed positive behavioral changes in multiple domains of functioning, as shown by a significant improvement in the average net points earned by groups ( $p < 0.01$ ) (Fig. 1). The eldest group (Group C) earned significantly more points than the youngest group (Group A) ( $1820.5 \pm 268.6$  vs  $876.8 \pm 268.6$ ,  $p = 0.039$ ). Both children with and with-

out co-morbid HFPDD significantly improved at the end of the STP ( $p < 0.01$ ); however, daily average points were significantly higher in the ADHD group compared to the ADHD + HFPDD group ( $p < 0.01$ ). The average number of time outs per day per child was significantly lower in Group B ( $0.8 \pm 0.9$ ) and Group C ( $0.6 \pm 0.7$ ) compared to Group A ( $2.3 \pm 2.9$ ) ( $p = 0.039$ ). The daily average numbers of rule violations by groups are shown in Fig. 2. The frequency of rule violations was significantly higher in Group A compared to Groups B and C ( $p = 0.028$ ); however, rule violations significantly decreased by the end of the STP in all the groups.

Parent ratings showed significant improvement in ADHD scores, ODD scores (Fig. 3), and hyperactivity/inattention and conduct problems ( $p < 0.05$ ). Parent-rated emotional problems, peer relationship problems, and pro-social behavior did not significantly improve, however.

Ninety-seven percent of the parents 1 week after the STP, and 93% after 4 months, were satisfied with the STP. The average ratings were 4.6, and 4.4, respectively, on the 5-point scale, reflecting very high levels of parent satisfaction.

#### 3.2. Case examples

One 7-year-old boy with ADHD co-morbid with HFPDD in the youngest group lost many points and served an excessive number of time outs. Because he disliked being hot during sports skills and game periods, and would become upset when he lost points, he often ran away from the activity area. Consequently, he lost many points (minus 9000 points) due to repeated non-compliance and running away. He required an individualized program from the second week, in which he could get his favorite Mushi-King<sup>R</sup> sticker on his card every time he was not in time out for 5 minutes, a DRO schedule of reinforcement. He could exchange each sticker

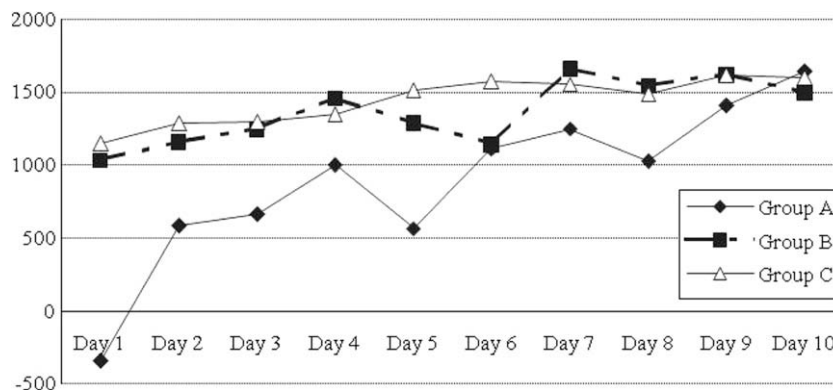


Fig. 1. Average daily points each group earned every day significantly improved day by day. The STP in 2006 started from Tuesday and the point system did not start on the first day. The days on which the point system worked were Wednesday and Thursday in the first week (Day 1–2), Monday through Thursday in the second and third week (Day 3–6, Day 7–10). In total, data on 10 days were evaluated.

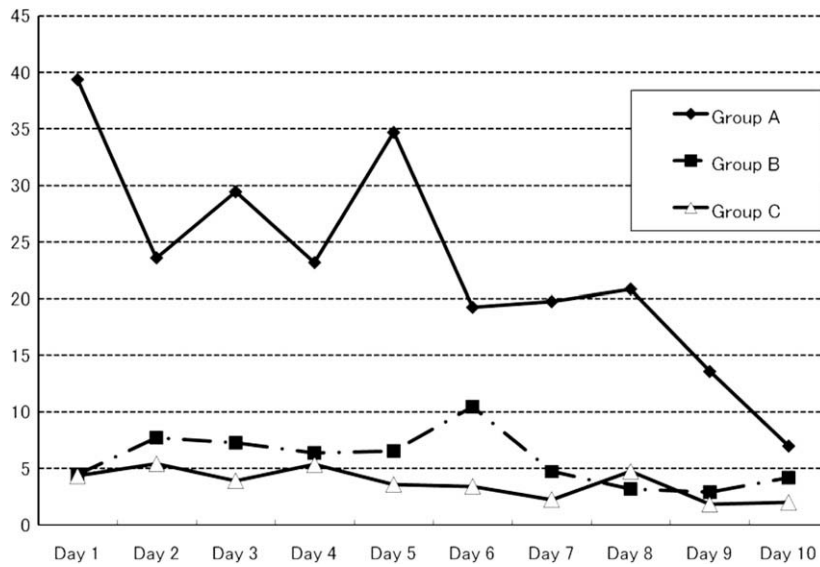


Fig. 2. Daily frequencies of rule violations in Group A were significantly higher compared to Groups B and C, however this rate decreased to the same level at the end of STP.

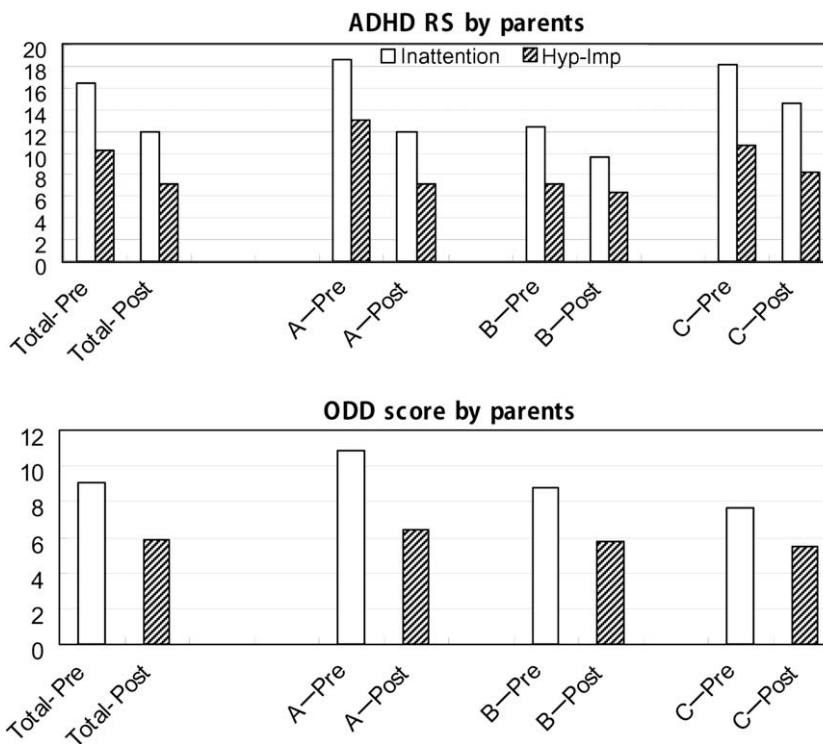


Fig. 3. Total; all groups combined, Hyp-Impuls: Hyperactivity-Impulsivity, Pre; Pre STP, Post; Post STP, A; Group A, B; Group B, C; Group C.

for 2 min activity in computer class. This program was very effective.

As a final indication of improvement, a 9-year-old boy with combined type ADHD in Group B who had participated in the previous year's STP and had many maximum-length time outs behaved extremely well in this STP. Another 8-year-old boy with HFPDD+ADHD who had excessive time outs in STP 2005 also showed sig-

nificant behavioral improvement in 2006. All children except one eldest male earned the Friday field trips each week.

#### 4. Discussion

This study provides preliminary evidence in Japanese children of the effectiveness of an intervention for

ADHD—the STP—that has a solid evidence base in North America. We document that a version of the STP that has been modified to fit with Japanese culture and school schedules is effective. We discuss these results below.

First, it has become increasingly evident that ADHD should be regarded as a chronic disorder with a poor long-term course and that models of treatment should be those pertinent for a chronic and refractory disease [17]. The most common treatment of ADHD is medication, mainly CNS stimulants. Medications have a large evidence base with short-term efficacy but have a number of limitations, including off-label use of short-acting methylphenidate for children and adults with ADHD in Japan. Furthermore, long-term studies of medication fail to document long-term benefits. It is thought that medication may not have a sufficient impact on peer relationships, parenting skills, and academic functioning, all of which are widely thought to be the mediators of long-term outcome in children with disruptive behavior disorders [3].

The second most common treatment for ADHD is behavior modification in the form of behavioral parent training, behavioral school interventions, and child-focused behavioral interventions such as the STP. Like medication, behavior modification has large evidence with short-term efficacy but has also limitations. The lack of specialists providing behavior modification and the need to work in the home, school, and peer settings makes it difficult to implement. Unlike medication, however, behavioral interventions can teach skills that overcome some of the key functional impairments associated with ADHD [6]. Indeed, the goals of STP are to improve the children's peer relationships, interactions with adults, academic performance, and self-efficacy, while training their parents in behavior management. These are the components which predict the prognosis of children with ADHD and which are not sufficiently improved by medication alone.

We started the Japanese version of the STP in 2005. The American STP usually last for 7–8 weeks, and there are preliminary data showing that a 5-week, partial day time period is effective [6]. However there have been no systematic parametric studies looking at the efficacy of shorter STPs. In Japan, the duration of summer vacation is less than 6 weeks, necessitating a shorter STP duration. Therefore, the purpose of this study was to evaluate whether an STP 3 weeks in length was effective for Japanese children with ADHD.

It is notable that none of the 36 children dropped out during the STP. This low dropout rate was extraordinary because some children who participated in our STP hated to play outside in summertime in their original schools, but they actively engaged in the outdoor sports activities during the STP. We believe that this was made possible by the intensive coaching by counsel-

ors and the positive reinforcement of participation through the point system. Pelham and Hoza reported that during a six-year period (1987–92), the drop-out rate from the STP was less than 3%, which was remarkably low compared to other intervention programs [11]. Thus, the dropout rate for Japanese children was comparable to that for the American program.

A few modifications were made to the program between 2005 and 2006 to maximize the efficacy of the 3-week program. For example, in 2005, it took a week for younger children to fully understand the point system. Thus, we provided a booklet that described the point system to families before this STP began and asked mothers to explain the point system to their children. This might have made it easier for children to understand the point system more quickly.

The significant improvement in net points earned, and decrease in time outs and rule violations during the STP, was observed at both the group and individual level. The only exception was the 7-year-old boy with ADHD co-morbid with HFPDD who required an individualized program but who subsequently improved during the final week of the program. These experiences suggest that STP might be effective not only in children with ADHD but also in some children with ADHD co-morbid with HFPDD because the STP is well structured with clearly defined rules and consequences that make it much easier to understand and function compared to the ordinary classroom. Additional studies will be necessary to determine whether a longer-duration program would be more beneficial for these ADHD + HFPDD children.

Parent rating scales showed significant improvement in ADHD scores, ODD scores, and hyperactivity/inattention and conduct problems ( $p < 0.05$ ). Emotional problems, peer relationship problems, and pro-social behavior did not significantly improve, however. We are not sure why peer relationship problems and pro-social behavior did not improve. One possible explanation is that the evaluations were made by parents and that improvement in peer relationships was hard to evaluate at home. Most measures of peer relations for ADHD are gathered in peer or school settings rather than home settings [18]. Alternatively, it might be because 3 weeks was not long enough to improve social behavior. Finally, it may be that the parent-training program that we employed was insufficient to improve behavior at home across multiple domains. In the American STPs, behavioral parent training is always a component and consists of 8, weekly, 2-h group sessions. This level of parent training is the standard minimal amount in North America [3], and we may need to increase our parent training in Japan to approximate this intensity.

It is estimated that 30–50% of children with ADHD have co-morbid ODD or CD. In our STP study, 13 chil-

dren had ODD, but none had CD. No evidence exists for differential response to treatments—either pharmacological or behavioral—for children with ADHD, ODD, or CD [3,19]. Furthermore, studies that had participants with ADHD alone and co-morbid with other disruptive behavior disorders reported behavioral or pharmacological treatment to be effective irrespective of co-morbid diagnosis. This is specifically true for the STP, where many studies have shown effectiveness that is equal in children with and without co-morbid ODD and CD [6].

A limitation of this study is that we only looked at the short-term efficacy of the STP. Longer-term follow-up will be necessary to evaluate whether the improvements in behavior seen in the STP will maintain. A promising development is that we encouraged teachers from the children's original classrooms to observe the STP, and more than 20 teachers visited. We also encouraged teachers to continue the DRC; however, the DRC was not always continued between home and school. In Buffalo, follow-up parent training and school interventions as a part of follow-up treatment are established by program therapists and/or paraprofessionals who work directly with teachers to ensure generalization to the children's school environment. Such follow-up was also given in the MTA study, in which the STP was the child-focused treatment and after which parent training and school intervention were delivered [20]. The improvement of the follow-up program in Kurume STP is an issue for further development. We are planning to establish a follow-up program in which school counselors at each elementary school work as behavior consultants to continue the DRC and other advice to school teachers. All the lead counselors participated in STP are working as school counselors at elementary school in Kurume City.

An important long-term benefit of the STP in Japan is that student counselors and teachers have the opportunity to learn fundamental skills for behavioral management that they can then carry forward in their work with children. The STP was useful to promote collaboration among many professionals from different disciplines, which had been lacking in Japan. More than 1000 undergraduate students have been trained through working in STPs in North America, and they have gone on to work in the educational, medical, or psychological fields [6]. We hope that the Japanese STP will fulfill a similar training role.

In addition to treatment and training, the STP will be useful to facilitate clinical research in Japan, because objective evaluation was possible by analyzing the daily records from the STP (e.g., daily report card, rule violations). The STP is also an ideal setting in which to evaluate the efficacy of medication, behavior modification, and combined treatments in a natural setting. Dozens of such studies have been conducted in the STP [12].

For example, Fabiano and colleagues have recently demonstrated that combined treatment of behavioral and pharmacological treatment could dramatically reduce the dose of medication necessary for normalizing functioning in ADHD children using an STP with different intensities of behavior modification and multiple doses of methylphenidate [9].

In summary, we have shown that the STP can be successfully implemented with Japanese children and that the program showed significant benefit for the children. The STP should be promoted in other sites in Japan as a component of comprehensive treatment for children and families with ADHD.

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