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A Pilot Study of Self-Care Program of Mindful Life Approach for Improvements of Socially Problematic Behaviors of Children with Developmental Disorders through Caregivers

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Abstract

Objective: To ascertain the problematic behaviors of children with developmental disorders through their parents who conduct the exercises based on the mindful life approach.

Subject: 22 Parents having children with developmental disorders agreed to join in our study. The number of children of the above was 14 boys and two girls. Most of the children were given a single diagnosis of PDD (43.8%) or a dual diagnosis of PDD and ADHD (43.8%).

Method: Before and after the three workshops, three self-administered questionnaires of the Japanese version of the Child Behavior Checklist (CBCL) 4-18, the Center for Epidemiologic Studies Depression Scale (CES-D) and the State-Trait Anxiety Inventory (STAI) were assessed.

Result: The changes of scores of the Externalizing scale and Aggressive behavior of CBCL in children had significantly decreased at the end of observation ($p<0.05$). For the changes in trait anxiety of the two parental groups of the more (N=6) or the less (N=5) improved regarding their children's score of the Aggressive behavior scale score of CBCL, the average in the last half of assessments was significantly lower than the average of the first half in the more improved group ($p<0.05$). The average of CES-D score in the more improved group (N=6) in Aggressive behavior scale score of CBCL was lower than in the less improved group (N=5) ($p<0.01$). For the changes of state anxiety scores, the average score of the more improved group (N=6) of the Externalizing scale of CBCL was significantly lower than that of the less improved group (N=5) within the observed period ($p<0.001$).

Conclusion: This study showed that the anti-social behaviours of the children with developmental disorders had been lowered by the improvements of their parent's mental states involving anxiety and depression through their mindful life exercises in daily situation.

Keywords: Mindfulness; Mindful life; Developmental disorders; Depression; Anxiety; Anti-social behaviors

Introduction

Recently, the studies of developmental disorders using mindfulness have increased, especially for Attention-Deficit Hyperactivity Disorder (ADHD) [1-3], Pervasive Developmental Disorder (PDD) [4] and Autism Spectrum Disorders (ASD) [5]. But few studies have been conducted on the parents of children with such disorders [6].

Parents of children with developmental disorders have experienced more stress than parents in the general population [7]. Especially when their children engage in challenging or problematic behaviors, the stress of their parents increases [8,9]. They are considered to shoulder a great burden in bringing up their children who have behavioral and social problems [10-13]. If the stress level of parents remains high, they might take it out on their children, resulting in deterioration in children's symptoms and mental state. Therefore, a certain support for such parents is needed to reduce their daily stress related to bringing up their children.

Parents of children with developmental disabilities reported much lowered stress after mindfulness-based training program [14-17]. Findings of quasi-experimental studies [18] indicated the effects of the Mindfulness Based Stress Reduction; MBSR to reduce stress in parents of young children with developmental disabilities. In addition, confirmatory evidence showed that stress could be reduced in parents of adolescents with ASD through a mindfulness-based positive behavior support program [10]. Though the developmental disorders per se are primarily a genetic inheritance, the secondary or induced problematic behaviors of children might be removed. If the parental burden were reduced by these interventions, one may also possibly improve the parent-child relationship.

Although the positive effects of Mindfulness Based Stress Reduction (MBSR) and Mindfulness Based Cognitive Therapy (MBCT) have been largely verified in clinical settings for chronically irritable symptoms or depression disorders which have multiple relapses [19,20], to obtain these benefits, one must be blessed by a variety of resources, such as accessibility to reliable mindfulness expert instructors, enough time to take treatment, and economic resources to pay for treatment. Not all parents can obtain these services of mindfulness-based therapy at a clinic. On the other hand, when they tried to learn such therapy and practice on their own, it seems to be difficult for them to spare the time to dedicate to lengthy meditative practices in rearing children, especially those with developmental disorders.

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In the field of behavioral science for the prevention of lifestyle-related diseases and social welfare, the psychosocial model approach emerged in the 1970s [21,22] contrary to the medical model which mainly focused on reducing symptoms of individual patients. Later, the so-called "life model" emerged in which professionals empowered the clients face their problems on their own, while adjusting their daily living environment [23,24].

A life model of mindfulness is needed to broaden the potentiality of the mindfulness-based approach to irritable physical or mental symptoms. This model first must be able to be conducted within a short period of time. Second, the practices are to be embedded in daily life activities. We have developed a program based on the above life model and have named it 'the mindful life approach'. This approach might be suitable for a family to have children with developmental disorders.

We applied the program for the families to change children's problematic behaviors through their parents, based on some theories of the cognitive neuro-sciences [25,26] and socially interactive attitude based on the principle of Aikido practices. The first aim of this study is to ascertain the children's problematic behaviors through their parents who conduct the exercises based on the mindful life approach. The second aim is to evaluate the changes of the parents' mental state to find the causal relations between children and their parents.

Method

Participants

Members of the two self-help groups of parents having children with developmental disorders, in which the second author had been an adviser as a psychiatrist, were recruited. The targeted geographical areas of the two groups were adjacent cities among outlying cities in Japan. 22 parents from 48 members (45.8%) agreed to participate in our study. They consisted of six couples (12 fathers and mothers) and 10 mothers. The number of children was 16. All of their diagnoses were made by other pediatricians or psychiatrists before the participants joined these groups.

The distribution of the type of developmental disorders was not very different, so we combined the groups as one sample for assessment. Table 1 shows characteristics of the subjects. The majority of the children were boys (14/16). They were 12.3 ± 1.8 years old. Most of the children were diagnosed with a single diagnosis of PDD (43.8%) or dual diagnosis of PDD and ADHD (43.8%). Apart from individual-based, when they were counted in diagnosis-based, the most frequent diagnosis was PDD (57.7%), and the second was ADHD (30.8%) among 26 diagnoses in total. The parents were 46.1 ± 4.6 years old. Over 80% of the fathers were full-time company employees and over 40% of the mothers were full-time homemakers.

Overall procedure

For assessing behavioral problems of the targeted children, a behavior check list was assessed by their mothers as a baseline assessment. Parents were given a Neuropsychiatric Interview and self-administered test on depression and anxiety. The workshops were held three times on weekends during summer vacation from July to August 2011. Self-administered questionnaires were assessed before and during the three workshops. In addition, after workshops, the same questionnaire sets were mailed to participants monthly and collected six times. Totally they were assessed 10 times. For assessing behavioral changes of children, a behavior check list was assessed by mothers again at the end of the study.

Children (N=16)		**Number**	**Mean**	**Sd**
Sex	Boys	14		
	Girls	2		
	Total	16		
Age	Boys		12.4	1.8
	Girls		11	-
	Total		12.3	1.8
Developmental disorders*		**Type**	**Number**	**Rate (%)**
	Single diagnosis	PDD	7	43.8
	Dual diagnosis	PDD + ADHD	7	43.8
		PDD + MR	1	6.3
		ADHD + LD	1	6.3
	Each diagnosis**	PDD	15	57.7
		ADHD	8	30.8
		LD	2	7.7
		MR	1	3.8
Parents (N=22)		**Number**	**Mean**	**Sd**
Sex	Father	6		
	Mother	16		
	Total	22		
Age	Father		47.1	4.4
	Mother		45.1	4.7
	Total		46.1	4.6
Occupation		**Type**	**Number**	**Rate (%)**
	Father	Company employee (full-time)	5	83.3
		Independent enterprise	1	16.7
	Mother	Company employee (full-time)	4	25.0
		Company employee (part-time)	5	31.3
		Full-time homemaker	7	43.8

* PDD Pervasive Developmental Disorder, ADHD Attention Deficit Hyperactivity Disorder, MR Mental Retardation, LD Learning Disorder

** Apart from single or dual diagnosis, it was counted in each diagnosis. Total number was 26.

Table 1: Characteristics of subjects.

Materials for Assessments

Children's behavioral problems

To assess the changes in the children's behavioral problems, the Japanese version of the Child Behavior Checklist (CBCL) 4-18 was used [27,28]. It allows the calculation of 8 different behavioral domains such as withdrawal, somatic complaints, anxiousness/depression, social, thought, attention problems, delinquent and aggressive behaviors. Mothers rated their child's problematic behaviors and competencies.

Neuropsychiatric interview of parents

The Mini-International Neuropsychiatric Interview (MINI) was carried out with parents [29]. It is a short structured clinical interview which enables researchers to make diagnoses of psychiatric disorders according to

DSM-IV or ICD-10, designed for epidemiological studies.

Psychological tests for mental well-being

Depression: For evaluating the parents' severity of depression, we used the Japanese version of the Center for Epidemiologic Studies

Depression Scale (CES-D), which provides cutoff scores (16 or greater) that aid in identifying individuals at risk for depression, with good sensitivity and specificity and high internal consistency [30,31].

Anxiety: For evaluating the parents' severity of anxiety, we used the Japanese version of the State-Trait Anxiety Inventory (STAI) [30,31]. State anxiety is affected by environmental events, relatively changeable with passing time, defined as fear, nervousness and discomfort, and the arousal of the autonomic nervous system induced by different situations that are perceived as dangerous [32]. On the other hand, trait anxiety is representative of the anxiety level affected by personal characteristics which can be defined as feelings of stress, worry and discomfort that one experiences on a day to day basis. This is usually perceived as how everyone feels during typical situations on a daily basis [32-34].

Preparation for workshops

In order for participants to learn the basic theory and exercise of mindfulness, the book explaining the MBSR stress reduction method [19] was distributed in advance.

Workshops: We had planned the workshops based on the mindful life approach shown in the Appendix. It contained the ways to recover from bodily fatigue, interpersonal skills with their children, preventing overeating, mental exercises for reducing regrets and anxiety through exercises associating with daily life. The first aim was to be conductible in a short time. The second was to motivate the parents who were not aware of mentally poor health.

Each workshop was held for approximately two hours. We provided six exercises from three aspects. One aspect was to reduce physical stress, the second was to reduce mental stress, and the third was to promote skills for practical matters in daily life such as interpersonal relationships with children and others, learning, and dieting. The lectures and explanations of the workshops were given by the first author.

To explain an example of the interpersonal exercise based on the principle of 'Aikido' which was introduced in "attention to body" of the 2nd workshop and "child-rearing" of the 3rd one. Participants became a twosome and were asked to establish reconciliation rather than conflict with their partner. Through this training, participants were expected to learn to make better relationships with their children in the reconciliation, for children to reduce the problems for unsocial behavior in relation to parents and others. The contents of these workshops were recorded in Compact Discs and delivered to all members including absentees.

Statistical Analysis

Changes of children's behavior

For those who responded to CBCL at baseline and at the end of the study, eight subscales and their two related factors i.e., the Internalizing and the Externalizing scale scores as well as total scores, were compared with Wilcoxon signed rank test (paired). Eight mothers dropped out from measurement of CBCL assessment at the end of the study. If the children's symptoms whose mothers dropped out were more serious or trivial than those of mothers who did not, the comparison of before and after measurements might be biased. To verify a possibility of this bias, we compared the score of CBCL between those who replied only once and twice with Wilcoxon rank sum test (not paired).

Changes of parents' anxiety and depression

Parents' CES-D and STAI were compared to confirm significant differences between the maximum and minimum values with Wilcoxon rank sum test (not paired).

Relationships between changes in children and parents' mental health

Among the subscales which showed a statistically significant decrease (improved) of the score in CBCL, the children's data were divided into two groups: those who improved more or less than average in each scale. Their corresponding parents' groups were also classified according to the groups. We observed their time-dependent changes in state and trait anxiety as well as depression. The average values of 10 assessments were compared between the more and the less improved groups with Wilcoxon rank sum test (not paired).

Among the more improved groups within which greater changes of each score of CES-D or STAI were seen during observation, comparisons were conducted between the first half average of five assessments which might reflect the impact of the workshops and the last half averages of five times assessments with Wilcoxon rank sum test (not paired). All statistical analyses were conducted using R3.0.2.

Confounding factor

There might be differences in the scores at baseline and after workshops between the two groups; in one both parents participated in the workshop, while in the other only mothers participated. We compared the average score of CBCL before and at the end of research observation between the two groups. We also compared the average scores of STAI and CES-D before, during and after the workshops between the groups.

Ethical Consideration

All participating parents gave written consent at the beginning of the study. The study was approved by the study ethic committee of Wakayama Medical University.

Results

Children's problematic behavior and parent's' mental state at baseline

Table 2 shows the mental state of subjects at baseline. For the children's

Children (N=16)		Number	Rate (%)
CBCL	Over 65	12	75.0
Parents (N=22)		Number	Rate (%)
MINI (Mini-international neuropsychiatric interview)	Major depression	1	4.5
	Suicide crisis	1	4.5
	Panic disorder	2	9.1
	Social phobia	3	13.6
	Compulsive disorder	1	4.5
	Alcohol dependency or abuse	1	4.5
	Bulimia nervosa	1	4.5
	General anxiety disorder final (GAF)	1	4.5
	Any diagnosis above (including overlapping)	8	36.4
CES-D	Over 16	7	31.8
STAI state-anxiety	Over 42	13	59.1
STAI trait-anxiety	Over 44	12	54.5

CES-D the Center for Epidemiologic Studies Depression Scale, *STAI* the State-Trait Anxiety Inventory,
CBCL the Child Behavior Checklist 4-18

Table 2: Mental state of subjects at baseline.

behavior, 75.0% of 16 children were clinically problematic at the baseline data of CBCL. For the parental mental state, eight of the parents (36.4%) had any psychiatric diagnosis according to the structured interview MINI. Seven of the parents (31.8%) seemed to be at a significant level of depression, 13 of them (59.1%) seemed to be at a clinically significant state anxiety level, and 12 (54.5%) had a clinically significant trait anxiety.

Consideration of biases of participation and confounding factor

The average participation rate of three-time workshops was 77.3%. The average return rate of 10 psychological tests was 53.8%. In the comparison of CBCL scores of baseline between those who replied only once at baseline and those who replied twice also in the end of observation, the score showed no statistically significant difference ($p>0.05$).

As for the comparison of the two groups of couples or mother only participants at the workshops, there was no significant difference in CBCL scores of children and STAI and CES-D of parents between the two groups. But some insightful tendencies were shown. As for the children's CBCL scores, the baseline Externalizing score of the mother only participant group was higher than the couple participant group ($P>0.07$). As for the parental scores of STAI and CES-D, several scores of the mother only participant group tended to be worse than the couple participant group. On the other hand, the mother only participant group improved more than the couple participant group.

Changes of children's problematic behavior

Figure 1 shows the changes in scores of the Externalizing (Figure 1a) and Aggressive behavior (Figure 1b) of CBCL. They had significantly decreased at the end of observation ($p<0.05$).

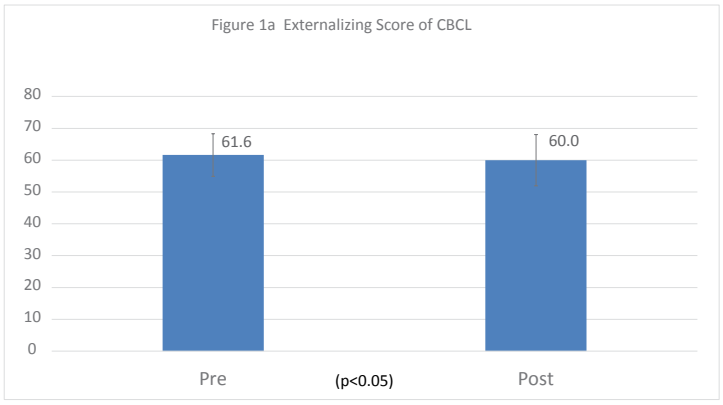
Changes of parent's mental state

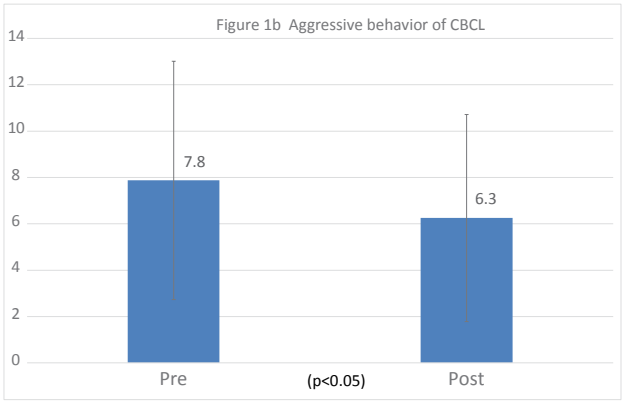
Figure 2 shows the depression and anxiety scores. Figure 2a shows the CES-D dropped until about two months after the last workshop. Figure 2b shows both state and trait anxiety. Although state anxiety rose gently after the 3rd workshop, the trait anxiety continued to be low until about two months after the last workshop. The statistical comparisons of all pairs between the maxim and the minimum values through the whole period did not show statistically significant differences ($p>0.05$).

Relation between parents and children

Figure 3 shows changes in trait anxiety of the two parent groups who were more (N=6) or less (N=5) improved regarding the Aggressive behavior scale score of CBCL. The averages of 10 assessments were not significantly different between the groups ($p>0.05$). In the more improved group, the average in the last half of assessments was significantly lower than the average of the first half ($p<0.05$).

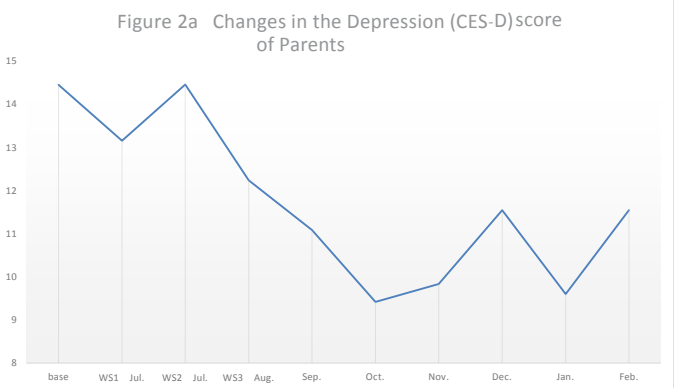
Figure 4 shows changes in CES-D scores in the more and less improved parental group in Aggressive behavior scale score of CBCL. Throughout all assessments, the average depression score in the more





Statistically compared between baseline and last outcome at February Wilcoxon signed-rank test

Figure 1: Improvements in behaviors of the children with developmental disorders.



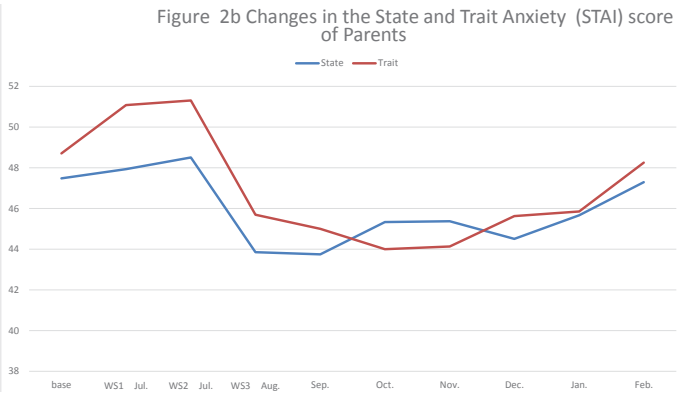
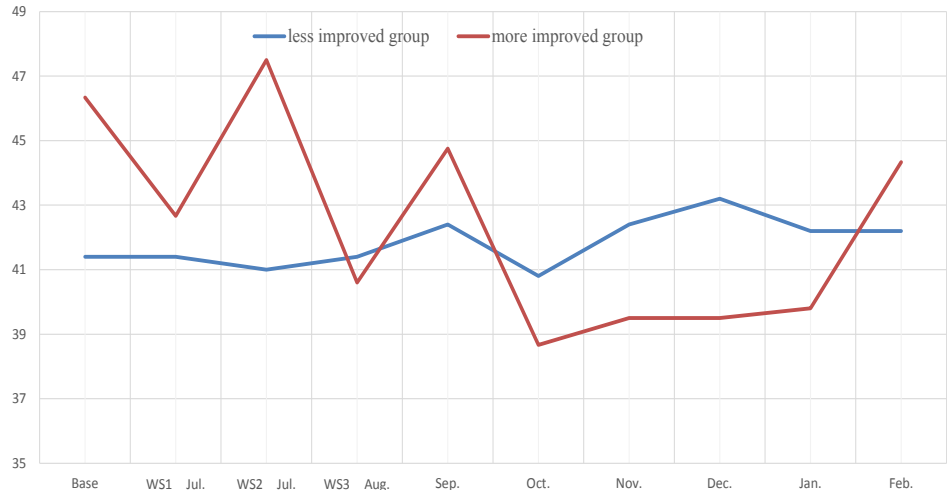
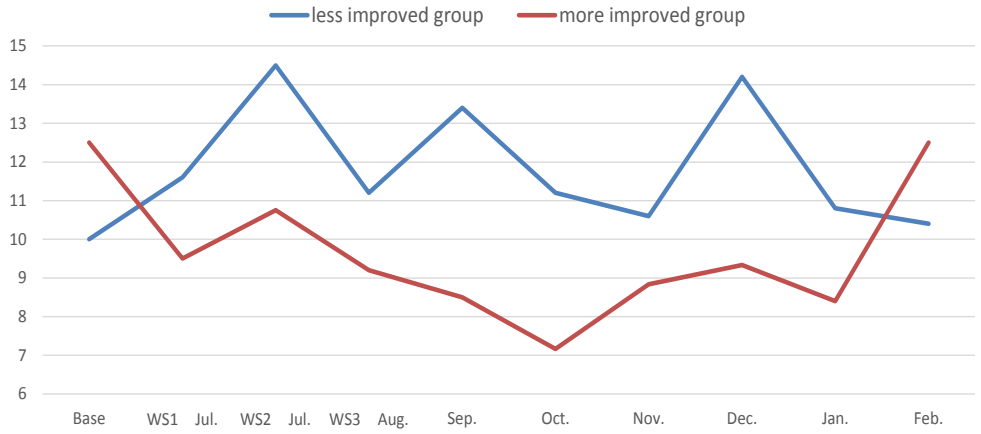


Figure 2: Change of scores in state and trait anxiety and depression of parents.



In the more improved group, the average in the last half of assessments was significantly lower than the average of the first half ($p<0.05$).

Figure 3: Trait anxiety scores of parents comparison of more and less improved aggressive behaviors in CBCL.



Statistically compared between more and less groups with Wilcoxon rank sum test ($p<0.01$)

Figure 4: Depression scores of parents comparison of more and less improved aggressive behaviors in CBCL.

improved group was lower than in the less improved group with statistical significance ($p<0.01$). As for the time-dependent change, the score of the more improved group had decreased after workshops.

In Figure 5 the changes of state anxiety scores of the two parent groups who were the more (N=6) and the less (N=5) improved on Externalizing scale of CBCL are shown. The average score of the more improved group was significantly lower than that of the less improved group within the observed period ($p<0.001$). Although the scores of the more improved groups had decreased in conjunction with the workshops, it had increased toward the end of the year.

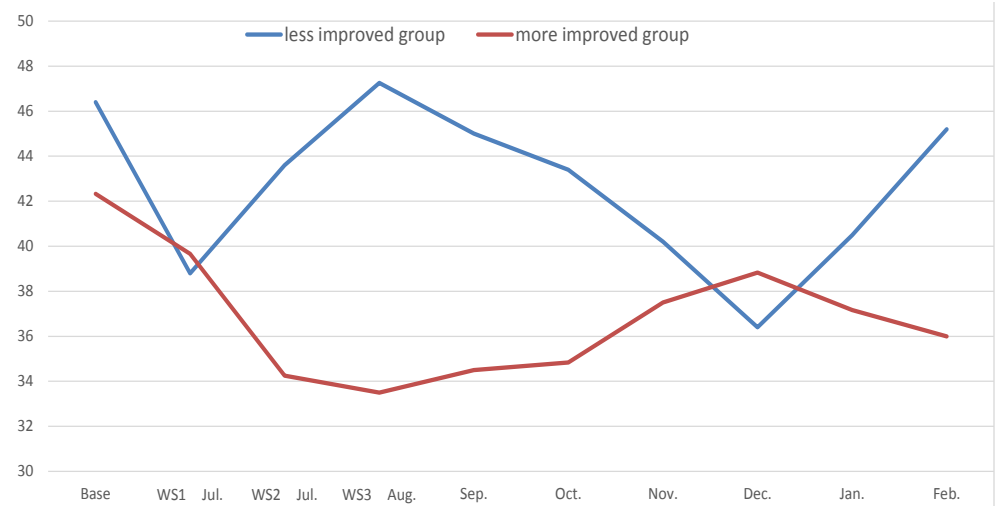
Discussion

Mindfulness is not originally a medical treatment. Given its background based on the religious tradition of Buddhism, it should not be limited to clinical patients but be open to the general population who experience difficulty in their daily life. In this study, we applied the program based on the mindful life approach for the parents of children with developmental disorders and evaluated their mental status repeatedly to observe the changes of children and parents.

However since this study is in the preliminary stage, this indirect approach may be expected to change the problematic behaviors of children who have socially problematic behavioral patterns.

Improvement of behaviors of children with developmental disorders

In our study, the scores of social problematic behaviors such as the Externalizing scale and Aggressive behavior evaluated by CBCL significantly decreased by half a year later of the workshops compared to the score at baseline. Studies by Singh et al. [14-17] showed that when parents of children with developmental disorders were trained into the mindfulness program, there was a sustained decrease in their children's problematic behaviors and an increase in the mothers' satisfaction with their parenting as well as interactions with their children. Further, mindfulness-based parenting was shown to result in improvements in the children's internalizing and externalizing symptoms [35]. The mechanism of the improvements is still unknown but it can be said that if the parenting attitude was changed to be more mindful, their children's behavior changed so as to become more stable.



Statistically compared between more and less improved groups with Wilcoxon rank sum test（p<0.001)

Figure 5: State anxiety scores of parents comparison of more and less improved *Externalizing scale* in CBCL.

Parental mental disorders and their changes

About one third of the parents of children with developmental disorders have any psychiatric disorders evaluated by the MINI. Furthermore, approximately one third of them seemed to be significantly depressed. In addition, nearly 60% of them appeared to have severe state anxiety, and about one half of them seemed to have clinically significant and severe trait anxiety. These facts suggest that the indirect intervention with children is also needed for improvement of parents.

In this study, although the differences of the maximum and the minimum values among repeated assessments were not statistically significant, the depression and anxiety had changed in conjunction with the timing of the workshops. All scores dropped after the 3rd workshop. The reason they did not start to drop after the 1st workshop was that the tests of CES-D and STAI were requested to be completed at the beginning of the workshops. Therefore, the scores indicated the mental state of participants from the last week just before the workshops started. The reason they did not start to drop after the 2nd workshop was assumed to be as follows. At the beginning of our workshops, we started reviewing the exercises of the previous workshop. The participants were given a chance to orally report about their practice during the past weeks and to ask some questions. In the 2nd workshop, a few participants reported their practices and the rest of the participants seemed to be motivated by the other participant's practical reports. In the 3rd workshop, at last, most of the participants voluntarily reported their experiences of practices, and came to understand their meaning. The score of the 3rd workshop seemed to reflect the changes induced by participation in the 2nd workshop.

After workshops, unfortunately, their data gradually reverted to the baseline level. Although it was in itself an unfortunate result, such movements would suggest that the effects of the workshops were not ignorable.

Relation between parents and children

Among the two parent groups with the more or the less improved Externalizing scale score of CBCL, the average trait anxiety during the last half was lower than in the first half in the more improved group (Figure 3). In addition, the average score of depression evaluated by CES-D in the more improved group of the Aggressive behavior scale score was lower than that of the less improved group (Figure 4). Likewise, the average of state anxiety in the more improved group of the Externalizing scale score was lower than that of the less improved group (Figure 5). The scores of these groups had decreased after workshops and had increased toward the end of the year. Considering these facts in light of previous research [4,7-10], one may think that the improvements in the aggressive behaviors of children occurred in conjunction with their parents' improvement of anxiety or depression.

Regarding the relation between children's behavior and their parent's mental state, we might say that parents' attitudes which became more mindful, in other words, more stable or unemotional in daily living, affect the mental state of their children [14-17]. Children may find the changes in parents' attitudes, mainly the mother's responses, begin to be more positive, and children's responses then become more positive to the parents—and the relation gradually changes the transactional pathway from negative to positive [36,37]. Maternal behaviors can act as motivating operations by affecting the likelihood of increasingly positive behaviors of their children, and vice versa [38]. In this regard, propagation of the psychological state of the parent to the child might be explained by the theory of brain science, especially by mirror neurons [39].

In this study, until the essential part of the developmental disability of these children had changed, at least the secondary disorders of the children with developmental disorders due to the poor parent-child relationship might have been reduced by the improvements in the mental state of the parents in the observed period.

Limitations

Several limitations should be considered in interpreting the current results. First, mothers whose depression and anxiety had improved might unconsciously overestimate their children's behavioral improvement since they themselves evaluated CBCL. Second, our study design was not under a randomly controlled trial. Thus, it is difficult to assert that the improved changes of children's behavior are only due to our workshops. Finally, it is impossible to touch on the dose-effect relationship because we did not evaluate how much the parents had conducted the exercises of mindful life approach in their daily life.

Conclusion

This study suggested that the anti-social behaviors of the children with developmental disorders had been attenuated by the improvements of their parent's mental states in terms of anxiety and depression through their mindful life exercises in daily situations. Because of some research limitations, future research is needed on a larger sample with a control group to examine in more detail the possible causal relationship.

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Appendix: Contents of workshops to exercise mindful life approach

1st workshop	
recovery from fatigue	loosening the tension out of the back and hip
	taking the stiffness of the neck
body action & mood	enjoying the freedom of body movement
	breathing slowly as if tasting good smell
mental	checking the realization of the desire from the past to satisfy the present
	seeing the present from the future to reduce the anxiety
commentary overall, Q & A	
2nd workshop	
review	moving slowly according to the "Radio gymnastics" *
	summarizing the point of the previous six practices
	sharing experiences of practice in two weeks
body sensation	pouring attention to own body
	pouring attention to the other's body **
body action & mood	moving with awareness of trajectories
	being aware of the afterimage
mental training	tasting the past events of just before to satisfy the present
	tasting future events to imagine as if had finished to reduce to anxiety
commentary overall, Q & A	
3rd workshop	
review	moving slowly according to the "Radio gymnastics" *
	summarizing the point of the previous six practices
	sharing experiences of practice in two weeks
child-rearing	Mindfulness teaching methods
	Mindful child-rearing method **
health and beauty	Mindful eating and drinking method
	Mental care shining beautifully from within
efficiency of work and study	Mindful learning method ***
	slow reading with hearing own voices
commentary overall, Q & A	

* modified version of nationwide popular gymnastics by public broadcasting and education
** interpersonal relationship with the essence of Aikido martial arts
*** ideas of Dr. Ellen Langer (Harvard University)
Other methods were originally developed and applied with cognitive science theories
Each Session was lasted 120 minutes. The majority of the contents of these were delivered again follow-up program by e-mails.