

An investigation of the effectiveness of family-centred positive behaviour support of young children with disabilities

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Positive Behaviour Intervention and Support (PBIS) is an evidence-based approach that has been proven to be effective in remediating problem behaviours in children. The purpose of this study was to evaluate the effectiveness of the family-centred PBIS approach when involving Taiwanese families in the treatment of off-task and non-compliant behaviours of three young children with disabilities. The single-subject design utilised multiple measurements to monitor dependent variables. Data of two targeted behaviours were collected in both centre and classroom settings from baseline to follow-up phases, though to meet the participating families' needs, intervention was primarily implemented in the centre setting. The results revealed that participants exhibited immediate and significant gains (i.e. a decreasing trend in the targeted behaviours) upon implementation of the intervention and that those gains were maintained after the cessation of intervention. Further evidence of efficacy of this intervention was found in the improvement in parents' ratings of acceptance of the PBIS approach and levels of parental stress. The follow-up data implied that PBIS may represent effective practices worthy of consideration for use with children in inclusive classrooms.

Keywords: family-centred; positive behaviour support; problem behaviours; young children with disabilities

Introduction

The need to address problem behaviours early in childhood has been well established (Powell et al. 2007). A strong literature base exists that connects early behavioural difficulties to a future of more severe behavioural problems (Gettinger and Stoiber 2006; Powell, Dunlap, and Fox 2006). Research suggests that the patterns of behavioural problems (e.g. non-compliance, aggression) may interfere with optimal learning and prosocial engagement with peers (Powell, Dunlap, and Fox 2006). Furthermore, many children struggle considerably with classroom environments, which can lead to a chronic cycle of both behavioural and academic problems throughout their school years (Barnett et al. 2006; Carter and Van Norman 2010). Consequently, the trajectory for children who exhibit problem behaviours at a young age may lead to a variety of negative outcomes such as school failure and expulsion from the classroom (Campbell 2002; Hojniski and Missall 2006; Walker, Ramsey, and Gresham 2004).

While determining assessment and interventions for young children with problem behaviours, a key element in effectively providing early intervention services is to

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collaborate with the family (Blair et al. 2011; Binnendyk and Lucyshyn 2009). Family-centred practice is a systematic way of creating a partnership with families. Involving families in intervention planning helps to ensure that the child's and the family's needs guide plans and that the interventions implemented strengthen and empower families (Dunlap et al. 2001; McLaughlin et al. 2012). Research conducted in Taiwan has also found that early intervention programmes with high levels of parental involvement appear to be more effective than those without (e.g. T.-L. Hsu 2006; S.-P. Hsu 2008; Tsai 2002). Legislation in Taiwan (e.g. The Special Education Act 2009) related to the development of pupils' Individualised Education Programmes (IEPs) also requires that parents be included. Of all the factors, family-centred practices undoubtedly have positive impacts on successful learning outcomes of children's education (Chen 2011; Chu 2012).

A considerable body of literature has supported the use of behavioural trainings involving families to ensure the implementation of effective strategies to promote the development of positive behaviours in children (Lucyshyn et al. 2007). Coming from the scientific approach of Applied behaviour analysis (ABA), the Positive Behaviour Intervention and Support (PBIS) model is the component of recent evidence-based practices designed to effectively address problem behaviours in young children, and it takes a more supportive approach by viewing the child as an individual and evaluating the quality of life of the child and his or her family (Carr et al. 2002; Niew 2009). PBIS includes the family as a critical component of the intervention and views the family as co-collaborators with the professional (Dunlap et al. 2001; Minke and Anderson 2005). Family-centred PBIS views the family members as key agents in the planning and designing of the intervention, specifically taking the embedded cultural values into account to ensure the appropriateness of the interventions by all stakeholders, including professionals and family members (Blair et al. 2011; Carr et al. 2002; Wang, McCart, and Turnbull 2007).

The current study of family-centred PBIS utilised the core features described by Binnendyk and Lucyshyn (2009), including collaborative partnership, functional assessments, contextual fit and meaningful lifestyle outcomes. In this study, "family-professional collaborative approach" refers to the establishment of a reciprocal relationship in terms of communication, advocacy and decision-making in the service delivery process. This partnership may include the design of intervention to promote families' and professionals' awareness and participation (Blair et al. 2011; Niew 2009; Turnbull et al. 2010). Utilising the functional assessment to gather information related to the child's inappropriate behaviour is an essential step in understanding preferred consequences or avoiding an unwanted consequence (Dunlap et al. 2001). Within the PBIS approach, it is important that the intervention plan fits with the family's values, strengths, available resources, adaptability and social support. The behavioural plan is evaluated to determine if it is congruent with the family's values, which is considered as contextual fit (Chu 2012; Wang, McCart, and Turnbull 2007). Finally, the long-term goal of PBIS seeks to produce significant and durable person-centred outcomes and improve quality of life for children and families (Lucyshyn et al. 2007).

Although studies have demonstrated the effectiveness of PBIS in decreasing challenging behaviours and promoting positive outcomes, research documenting the utility and applicability of PBIS with young children remains scarce. Previous studies either were conducted in classroom settings or focused on certain types of disabilities. In Taiwan, there is a relative dearth of literature concerning the implementation of PBIS in early childhood contexts, particularly involving families in the intervention process (Chu 2012). Despite this, the evidence-based approach of PBIS has been proven to promote

positive outcomes for individuals with challenging behaviours (Lucyshyn et al. 2007). On the other hand, research has found that families often respond to young children's behaviours in inappropriate ways (Wakschlag et al. 2007), suggesting that they need access to evidence-based intervention so they can address inappropriate behaviours appropriately (Chu 2012). Families whose children display conduct problems also tend to unintentionally reinforce maladaptive behaviours (Wakschlag et al. 2007). Considering the above, a need exists for involving families in the development of the behaviour-support plan process, allowing them to participate in problem-solving, understanding behavioural function and identifying strategies that may promote positive behaviour and reduce challenging behaviour (Binnendyk and Lucyshyn 2009; Lucyshyn et al. 2007).

Taken together, family-centred PBIS suggests that by involving families in the implementation of the intervention, they become empowered. Studies (e.g. Gettinger and Stoiber 2006; Ingersoll and Dvortcsak 2006) have also shown that parent-professional partnerships are associated with children's success in school. These studies were mainly conducted in the United States. On the other hand, in Taiwan, society holds professionals in high regard, with communication styles taking more of a top-down approach, from professionals to parents, instead of the approach described in the previous studies (Ting-Toomey and Chung 2005). This difference points out that families may have different values, child-rearing styles, beliefs about disabilities and types of communication than those held by professionals (Chu and Wu 2012; Huang 2011). Due to the high value placed on professionals' perspectives, Taiwanese families are unlikely to speak up even though they may disagree with professionals' disciplinary actions in the service delivery of early intervention. These cultural differences may affect the parent-professional relationships (Chu and Wu 2012). Recognising the collaboration of parents and professional as the fundamental aspect of PBIS, the goal of this training programme is to involve families of children with disabilities in evaluating the effectiveness of such an approach for addressing problem behaviours in meaningful contexts. The present study also seeks to extend the PBIS research and add to the literature based on implementing PBIS for children with different types of disabilities in a Taiwanese early childhood context. The following research questions will be addressed: (1) Does PBIS decrease the participating children's off-task and non-compliant behaviours in the targeted setting? (2) Does PBIS result in collateral changes in target behaviours of the children across settings? (3) Does PBIS increase the participating families' involvement opportunities? (4) Does PBIS evaluate the participating families' social validity for the PBIS process?

Method

Selection of participants

Participants in this study were kindergarten children with disabilities and their families who met the following inclusionary criteria: (1) the child had an identified special need or disability; (2) endorsement was given by the child's family and/or teacher in at least one area of concern regarding the child's behaviour at home or at school (e.g. off-task, disruption, aggression, non-compliance) and (3) agreement was given by the child's family to participate in this intervention.

Participants were recruited from the Chinese Association of Early Intervention Program for Children with Developmental Delays (CAEIP) in an eastern city in Taiwan. Initially, the social workers from CAEIP contacted potential families to see their willingness for participating in this study. Once they agreed, the researcher contacted

them and distributed the consent forms to the parents before the research started. The participating families were asked to read carefully and sign after they approved of the content of the informed consent. In addition, participants from the city had the highest percentage of school-aged pupils who were low-achieving (e.g. high rates of illiteracy). This city also comprised the highest percentage of the aboriginal population, and the children were more likely to have parents with limited education, have high rates of illiteracy or be reared by grandparents. This is also one of the most economically disadvantaged cities in Taiwan.

Profiles of participating children, families and the trainer

One of the core features of PBIS is to consider contextual fit (Binnendyk and Lucyshyn 2009; Blair et al. 2011), which refers to carefully planning interventions in conjunction with the families' needs. Thus, understanding each family's context is essential to facilitating family involvement during this process. During the home visits, each participating family provided background information related to targeted children's and their needs, which was then incorporated into the intervention plan.

All participating children received one or more disability-related services in the local hospital (e.g. speech therapy). According to the results of the Receptive and Expressive Vocabulary Test (Huang et al. 2011) three targeted children demonstrated moderate to severe language impairment. They qualified for financial aid for treatment from the Ministry of the Interior of Taiwan. All participating adults were also the primary caregivers for the target children. A description of the participants' demographic information is given here.

Yuan and his family

Yuan was a six-year-old boy who had been diagnosed with autism and was placed in an inclusive classroom at a private kindergarten. He lived with his parents and his younger brother, who had also been diagnosed with autism. Yuan's mother had depression and was unable to care for her two children with autism, and his father participated in this study. He was able to communicate using two- or three-word phrases and could follow adults' directions. His father said that his son frequently exhibits aggression and disruptive behaviours, which include crying, tantrums and throwing things. Because Yuan's father would like for him to smoothly transfer to first grade in the general education setting, he wanted Yuan to learn how to comply with adults' requests and stay focused.

Cheng and his family

Cheng was a five-year-old boy who had been diagnosed with a moderate intellectual disability, attending the same kindergarten as Yuan (Cheng received a tuition waiver due to his family's economic status). He lived with his grandparents, two brothers who had also been diagnosed with moderate intellectual disabilities, and two typically developing siblings. Cheng's grandmother (unemployed) was the primary caregiver. He had good communication skills but frequently demonstrated problem behaviours (e.g. unable to follow directions, physical aggression towards peers). He was referred to receive services from CAEIP by a social worker because his behavioural problems affected his social skills and learning progress. In the initial contact, we communicated with Cheng's family

through the social worker. The family stated that they wanted Cheng's long-term goals to include attending to tasks as directed by the teacher and positively interacting with peers.

Kang and his family

Kang was a six-year-old boy who had been diagnosed with cerebral palsy and who was receiving education from the same school as the other two children described above. Kang lived with his grandparents, and they received social service benefits to support themselves. Kang's grandmother (unemployed) was the primary caregiver. He was nonverbal and used gestures to communicate. According to Kang's kindergarten's teacher, he had strengths in the areas of vocal and motor imitation and problem-solving skills, which served as a foundation to promote learning. The reason he had been referred to the programme was that Kang's grandmother wanted him to receive more one-on-one instruction. Specifically, his grandmother indicated that she did not have the necessary parenting skills to train Kang to work on schoolwork and wanted him to be involved in different tasks (e.g. independently complete worksheets, learn how to ask for help, and play games with peers).

Trainers

Two trained college pupils (i.e. trainers) were assigned to work with each of the targeted children, of a total of six trainers included in this study. In each session, one trainer worked with the child while the other trainer assisted with data collection. Before working with the participating children, these trainers took three to five courses and had received 20–36 hours of practical trainings related to behavioural techniques and family-centred practices.

Setting

During home visits, the targeted families reported that they did not consider the home as an appropriate place to train their children to be involved in different tasks (because, for example, they were living with extended family members, did not have sufficient space, could not afford to buy teaching materials, etc.). Because of the potential that home environments might limit targeted children's learning, the researcher discussed with all the families that intervention sessions would be conducted in the quiet room at the Child Development Centre of a university in the local city. For each session, each targeted child was scheduled in the same room from baseline to intervention phases of the study. Sessions were conducted two or three times per week, and each session lasted approximately 60 minutes. The weekly parent–professional discussion meetings were held in the meeting room of the centre. All sessions were videotaped to facilitate parent–professional discussions about their children's learning progress.

To meet participating families' expectations, follow-up data were collected in each targeted child's classroom (i.e. to confirm that transferring of training occurred in the natural setting). Before implementing the interventions, observations were also conducted to collect data to capture targeted behaviours in the classrooms during both baseline and intervention phases. The student–teacher ratio was 1:22. Cheng and Kang were the only children with disabilities in their classrooms, while there were other children with disabilities in Yuan's classroom. To ensure consistency across participants as well as to

have the ability to capture targeted behaviours, observation data were collected during centre time.

Research design

Before implementing the intervention, functional assessments were utilised to identify environmental events, circumstances and interactions that trigger and maintain problem behaviours (Dunlap et al. 2001). The direct observation and interviews were utilised to identify the function of behaviours for each participating child, and the results of the functional assessments were used to develop an informed intervention plan.

This study employed a single-subject experimental design, using multiple baselines across subjects to document the effects of PBIS implementation on the dependent variables (decreasing off-task and non-compliant behaviours). The study comprised three phases: baseline, intervention and follow-up. Specific procedures, including functional assessment, are described in the next section.

Procedures

Functional assessment

The functional assessment interview was completed using a modified version of the *Functional Assessment Interview* (FAI; O'Neill et al. 1997). The FAI was conducted in the participating families' homes and was completed in approximately 60–90 minutes. The information gathered from direct observations using an A-B-C analysis (O'Neill et al. 1997) identified events that were maintaining the problem behaviours. The researcher conducted two to three observations in the home and school settings during 15- to 30-minute periods of targeted routines (i.e. dinner routine at home and centre time at school). Results from these assessments revealed that the three children engaged in high rates of problem behaviours when adults requested that they complete non-preferred tasks (e.g. clean the table) or when adults interrupted them while they were engaged in preferred activities (e.g. playing with cars). In addition, the data showed that low rates of problem behaviours occurred during participating children's independent play or during activities involving high-preference materials.

Baseline

No behaviour-management techniques were used with the participants during the baseline phase. The activities (i.e. tasks and requests in different skill areas) that the trainer provided in this phase were similar to those in the intervention phase, but no behavioural teaching strategies (e.g. promoting, discrete trial training, positive reinforcement, etc.) were used. The targeted behaviours were observed three times in the inclusive classrooms for each participating child. These participants were observed during the 20–30 minute circle times. Through three informal meetings and observations in this phase, each child's behavioural goals were set by the researcher and each participating family.

Intervention

The same toys, materials, media and activities that were available to the children in the baseline phase were again available in the intervention phase. The behaviour-intervention

strategies (positive reinforcement, differential attention and escape extinction) deemed appropriate based on the functional assessment were implemented. Taking family-centred practices as the core of this programme, family ecology information was used to ensure that the plan was contextually appropriate (Lucyshyn et al. 2007), and the researcher and parents jointly developed plans of action and then implemented the behaviour-support plans.

To ensure that the children engage in the tasks, the key behavioural techniques incorporated into the teaching procedures were used for the three participants, including errorless teaching, variable ratio for getting reinforcer, most-to-least prompting, interspersing easy and hard demands, and fast-paced instruction. These techniques were utilised to reduce children's motivation to engage in target behaviours and to pair the work area with the reinforcement. The strategies were utilised differently for each child. For example, for the token economy, the trainer posed Yuan with two to three tasks (mixed easy and difficult demands), and he could earn one token when he completed these tasks without demonstrating targeted behaviours. He could receive reinforcers (e.g. car or cookie) with every five tokens. The procedure was the same for Cheng, while Kang gained access to his favourite board game for one minute when he completed every five to seven tasks.

Follow-up

This condition was identical to baseline, wherein no intervention was implemented. The researcher observed each child in his or her inclusive classroom for a 20- to 30-minute period to collect maintenance data on the target behaviours. Each child was observed during centre time. The PBIS faded, and classroom teachers did not specifically use the intervention strategies (even though all teachers were aware of the implementation of this intervention). The purpose of this observation was to collect information on the sustained impact of the intervention for each of the participants. The classrooms were chosen for follow-up observations because families were concerned about the impacts of behavioural problems on the children's school participation and about whether their children were ready for the inclusive learning environment.

Response definition and measurement

To design behaviour interventions that fit well with families' needs, three families addressed their stress and difficulty in handling their children's problem behaviours during daily routines. More data collection from those discussions is described as follows.

Dependent variable

Two problem behaviours were defined for the three targeted children. *Off-task behaviour* was defined as disengaging from the learning environment (i.e. not involved in the learning task or material), leaving the workplace, failing to complete assignments, talking to peers and not engaging in the expected behaviour initiated by the adult. *Non-compliance* was defined as refusing to follow rules and failing to initiate a response within five seconds of being given direction.

Independent variable

PBIS. The implementation of PBIS was the independent variable for this study. According to the results of the functional assessments, a comprehensive set of strategies was designed to prevent problem behaviours and teach children new skills, making problem behaviours unnecessary. The intervention strategies taught to the trainers, and observed during trainer-directed activities, were adopted from the key features of PBIS (e.g. collaborative partnership with families, functional assessments and long-term outcomes), which was described by Binnendyk and Lucyshyn (2009). Considering that family-centred practices are the core of PBIS, family ecology information was included to ensure that the plan was contextually appropriate. The participating families, the researcher and the trainers jointly developed the plans (see Table 1).

Curriculum and lesson plan. Participating children were provided with many learning trials to practise language skills. The Assessment of Basic Language and Learning Skills – Revised (The ABLLS-R) was used as the assessment and curriculum guide. During table time (i.e. on task), the trainer mixed tasks from various skill areas, including motor imitation, receptive identification of objects or pictures, and mands (requests). The tasks on the ABLLS-R were developed based on each target child's levels of skills.

Trainers' training and support.

The researcher provided training and technical support to six trainers for this study. Before implementing the study, formal training involved instruction on the concepts of the PBIS approach for all trainers, including 72 coursework hours and the use of the specified behavioural strategies (e.g. behavioural momentum, errorless teaching strategy). Videotaped examples or role-plays of each strategy were utilised, and time was provided for questions and examples to be discussed. As for the follow-up phase, the classroom teachers of the three targeted children did not receive formal training regarding the PBIS concepts but regularly received PBIS written information sent by the researcher throughout all phases of the study. The researcher also visited the school setting on several days at scheduled times to discuss the targeted strategies and answer questions raised by the classroom teachers.

The trainers' and participating children's behaviours were observed during the baseline and intervention phases. Following the formal training, limited verbal engagement occurred between the researcher and the trainers unless a trainer had a question about the use of strategies. Daily performance feedback was provided to the trainers on their use of strategies. Feedback meetings were held every two weeks so that the trainers could receive continuous support. In addition, targeted behaviours as well as the use of strategies were reviewed during this meeting.

Parents' role in this training.

This programme emphasised working together with families. An overview of the roles of family involvement throughout the study is provided in Table 2. Before implementing this study, the researcher held a parent-professional conference for all participating families in the targeted children's kindergarten classroom. Reflecting on the concept of the family-centred PBIS approach, an emphasis on communication and mutual valuation of partners (i.e. families and professionals) in the relationship is essential to promote children's learning (Chu and Wu 2012). The purpose of this conference was to build two-way communication in order to promote a mutual understanding of each family's preferred approach to communication, their expectations, their levels of involvement and their difficulty in participation.

Table 1. Positive behaviour support plan.

	Setting event strategies	Preventing procedures	Teach new skills	Response strategies
Yuan	<ol style="list-style-type: none"> 1. Mediate with a preferred interaction or item to motivate cooperation 2. Use visual displays to predict activities in each session. 3. When Yuan appeared irritated before presenting tasks, increase positive events (e.g. a signal to predict a break) 	<ol style="list-style-type: none"> 1. Present variable ratio of reinforcement. 2. Use “errorless teaching” strategy. 3. Use “behavioural momentum” techniques. 4. Intersperse easy and hard demands. 5. Use positive contingency statements to motivate on tasks. 6. Ensure task success with most-to-least prompt. 7. Ensure fluency instruction. 	<ol style="list-style-type: none"> 1. Use social board games to teach Yuan to (a) use eye contact with instructors, (b) wait for turn-taking, (c) comply with “no” cue, (d) follow directions and (3) learn social rules. 2. Teach Yuan to use appropriate languages to communicate his needs. 	<ol style="list-style-type: none"> 1. Use escape extinction procedure when engaging non-compliant behaviours 2. Use blocking and redirecting strategies when engaged in disruptive behaviours 3. Provide praise preferred items, or activities contingent on participating children’s cooperation and/or following directions
Cheng	<ol style="list-style-type: none"> 1. Give verbal information to predict activities and transitions in each session. 2. Promote positive interaction (i.e. paring) with trainers 3. Ensure embedded reinforcers 		<ol style="list-style-type: none"> 1. Use behavioural contract to teach Cheng to follow rules, be cooperative and wait for a break. 	
Kang	<ol style="list-style-type: none"> 1. When Kang was ill, lower hard tasks and decrease demands. 2. Provide information to Kang that helped him predict what he was going to be do next. 3. Ensure embedded reinforcers 		<ol style="list-style-type: none"> 1. Teach Kang to use augmentative and alternative communication system (gesture, sign language and picture symbols) to (a) express needs, (b) comply rules and (c) wait for a break. 	

Table 2. Overview of family involvement.

Phase	Role of family involvement	Parent training: behavioural techniques
Before intervention	<ul style="list-style-type: none"> ● Preliminary assessment ● Programme planning 	Basic concepts of ABA: behaviour functions, three-term contingency, consequence control, etc.
During intervention	<ul style="list-style-type: none"> ● Discuss and modify goals and strategies with professionals ● Review each session's data with professionals ● Parent-professional conference and parent training 	Intervention strategies: differential reinforcement, prompting hierarchy, shaping, chaining, extinction, errorless teaching, discrete trial training, etc.
After intervention	<ul style="list-style-type: none"> ● Involving IEP decision-making process ● Develop behavioural plan with professional consultation ● Collaborate with teachers in inclusive classroom settings 	Develop behavioural plan with classroom teachers

During the intervention sessions, the trainer followed the programme guidelines that had been developed with the families. Each session was videotaped, and families reviewed these video clips during monthly parent-professional meetings. After the implementation of individual intervention sessions, the researcher provided families with opportunities to learn strategies related to behavioural techniques. Each family received weekly lesson plans, which were discussed in face-to-face meetings with the trainer every two weeks. The targeted families observed how the trainers worked with their children at least one time every two weeks. The researcher and all the trainers reviewed data with the participating families on a monthly basis. During the implementation phase, Yuan's father took an active role in sharing with other professionals what he learned from this programme. This allowed other professionals to gain more strategies on the best way to work with Yuan. Kang's grandmother frequently communicated with the researchers regarding Kang's performance at home and informed them of her strengths and limitations in assisting Kang. Although Cheng's grandmother tended to be passively involved in the process, she provided feedback when reviewing video clips, which was helpful in modifying Cheng's educational goals. Over the course of the programme, the triad reviewed results, rated goal attainment for the children, and established new goals as needed.

Treatment integrity. Data were collected by the researcher throughout the training period regarding the trainers' proficiency in implementing intervention strategies to ensure that intervention components were being correctly executed. The researcher utilised a fidelity checklist to evaluate the intervention sessions. Each checklist was scored by giving 2 points to each correctly answered question and multiplying the total score by 100%. The overall treatment integrity for the intervention phase was 90% (range: 81–100%).

Data collection

Behavioural observation form. Observational data were collected for each child using an interval recording technique. Data were collected in both centre and classroom settings

during the baseline and intervention phases. Two rows of targeted behaviours were coded on the observation form, including off-task/attending behaviour on the first row and compliance/non-compliance on the second row. Fifteen-minute observation periods were divided into 15-second intervals, and partial interval recording was used.

Parenting Stress Index – Short Form (PSI-SF). The PSI-SF was administered to participating families pre- and post-intervention to collect data regarding parenting stress levels (Abidin 1995). The PSI-SF yields a “Total Stress” score that is made up of the scores of three scales: Parental Distress, Parent–Child Dysfunctional Interaction and Difficult Child. The Total Stress score was obtained by summing the scores on the individual items, with a higher score indicating a higher level of stress. This measure has been shown to be helpful in identifying high-stress areas, assessing family functioning and parenting skills and assisting with intervention planning. The form consists of 36 items and takes approximately 10 minutes to complete. Participating families were asked to complete this form during the baseline and follow-up phases.

Treatment Evaluation Inventory – Short Form (TEI-SF). This measure (Kelley et al. 1989) was used to evaluate treatment acceptability and parents’ acceptance of procedures for children with behaviour problems. Dimensions included acceptability, predicted effectiveness of a given treatment and discomfort associated with treatment. It has been designed to measure social validity, which is concerned with the acceptability of different dimensions of treatment, including goals, procedures and outcomes. Participating families were asked to answer all of the questions regarding their beliefs about this intervention programme. All participating families were asked to rate each item on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The TEI-SF was administered at all assessment points (minimum is 9 points and maximum is 45 points) and was completed during the baseline and follow-up phases.

Interobserver reliability. Interobserver agreement (IOA) refers to the degree to which two or more independent observers report the same observed values after measuring the same events (Cooper, Heron, and Heward 2007). The primary investigator and a second observer (i.e. research assistant who has been trained for data recoding) simultaneously and independently recorded data on the target behaviours for at least 30% of all sessions for each participant during each phase of the study. Data from the two observers were compared for agreement. An agreement was defined as the total number of times that the behaviour occurred. Any discrepancy between the observers’ scoring resulted in a disagreement.

The IOA scores of each session were added together and divided by the total number of sessions in which reliability data were gathered in order to calculate the overall average IOA. The mean IOA combined across all sessions ranged from 88% to 100% (see Table 3).

Table 3. Interobserver agreement.

Participant	Phase I baseline (%)	Phase II intervention (%)	Phase III follow-up (%)
Yuan	100	88	95
Cheng	100	92	95
Kang	100	95	100

Data analysis

Intervention data were visually analysed by plotting the percentage of intervals in which the behaviours were observed to occur. The rates of behaviour across baseline, intervention and follow-up periods were examined. *Follow-up period* refers to 4-week observations that were collected following the completion of the 11–17 intervention sessions. Scores from the PSI-SF were converted to percentiles and compared according to pre- and post-intervention. The scores of the TEI-SF were summarised and the mean scores presented.

Results

Dependent variables: off-task and non-compliant behaviours

Upon visually examining the graphic representation of the data (see [Figures 1 and 2](#)), it was evident that all participants demonstrated positive changes in their levels of attending and compliance from baseline to intervention. In the baseline phase, the average rates of off-task behaviour were 98%, 92% and 63% for Yuan (range: 95–100%), Cheng (range: 90–95%) and Kang (range: 55–70%), respectively. In the classroom settings, the average rates of this behaviour were 90%, 85% and 50% for Yuan, Cheng and Kang, respectively. When the PBIS was implemented, the per cent of off-task behaviour immediately decreased to an average of 61%, 60% and 30% for Yuan (range: 48–80%), Cheng (range: 45–75%) and Kang (range: 22–45%), respectively. During the intervention phase, the average rates of this behaviour demonstrated in the classroom setting were 69%, 58% and 40% for Yuan, Cheng and Kang, respectively. During the follow-up, the off-task behaviours maintained a decreasing trend, with an average of 45%, 49% and 25% for Yuan (range: 40–48%), Cheng (range: 48–50%) and Kang (range: 25–25%), respectively. This result demonstrated that off-task behaviours decreased in a different setting.

Additionally, all participants demonstrated decreases in non-compliance following implementation of the interventions. In the baseline phase, the average rates of non-compliant behaviour were 93%, 71% and 54% for Yuan (range: 90–95%), Cheng (range: 65–75%) and Kang (range: 45–58%), respectively. In the classroom settings, the average rates of this behaviour were 82%, 80% and 45% for Yuan, Cheng and Kang, respectively. In the intervention phase, the per cent of non-compliant behaviour decreased to an average of 58%, 45% and 26% for Yuan (range: 43–79%), Cheng (range: 32–62%) and Kang (range: 18–41%), respectively. During the intervention phase, the average rates of this behaviour demonstrated in the classroom setting were 59%, 51% and 32% for Yuan, Cheng and Kang, respectively. The compliance for three participants maintained a decreasing trend (average rates were 49%, 40% and 27% for Yuan, Cheng and Kang, respectively) in the follow-up, indicating the generalisation of such behaviour in the classroom.

PSI-SF

In general, the normal range for scores is from the 15th to the 80th percentile. Scores in the 85th percentile and above are considered to be high, and clinically significant scores are typically above the 90th percentile (Abidin 1995). Participating families' scores on the Total Stress survey and its three subscales are presented in [Tables 4 and 5](#). Yuan's and Cheng's families scored in the high range on the difficult child domain at preintervention, but this score decreased to the typical range during the follow-up phase. Specifically,

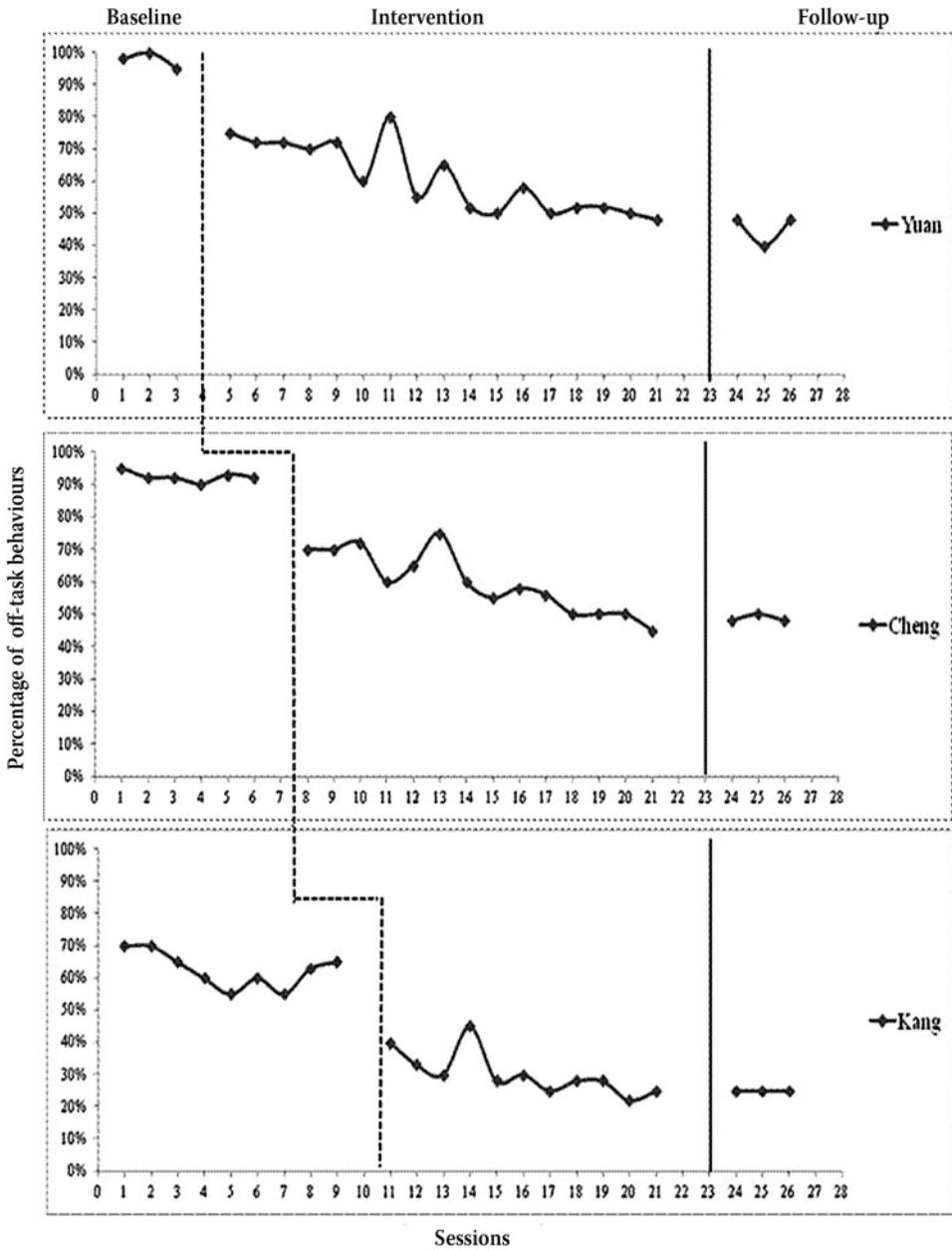


Figure 1. Percentage of off-task behaviours.

Yuan’s father scored in the significant range on the Total Stress survey, but his score decreased to the normal range in the follow-up phase. Overall, the scores for two of the families fell to points within the typical range, and the scores in the three domains and on the Total Stress survey decreased from the baseline to the follow-up phase for all participating families.

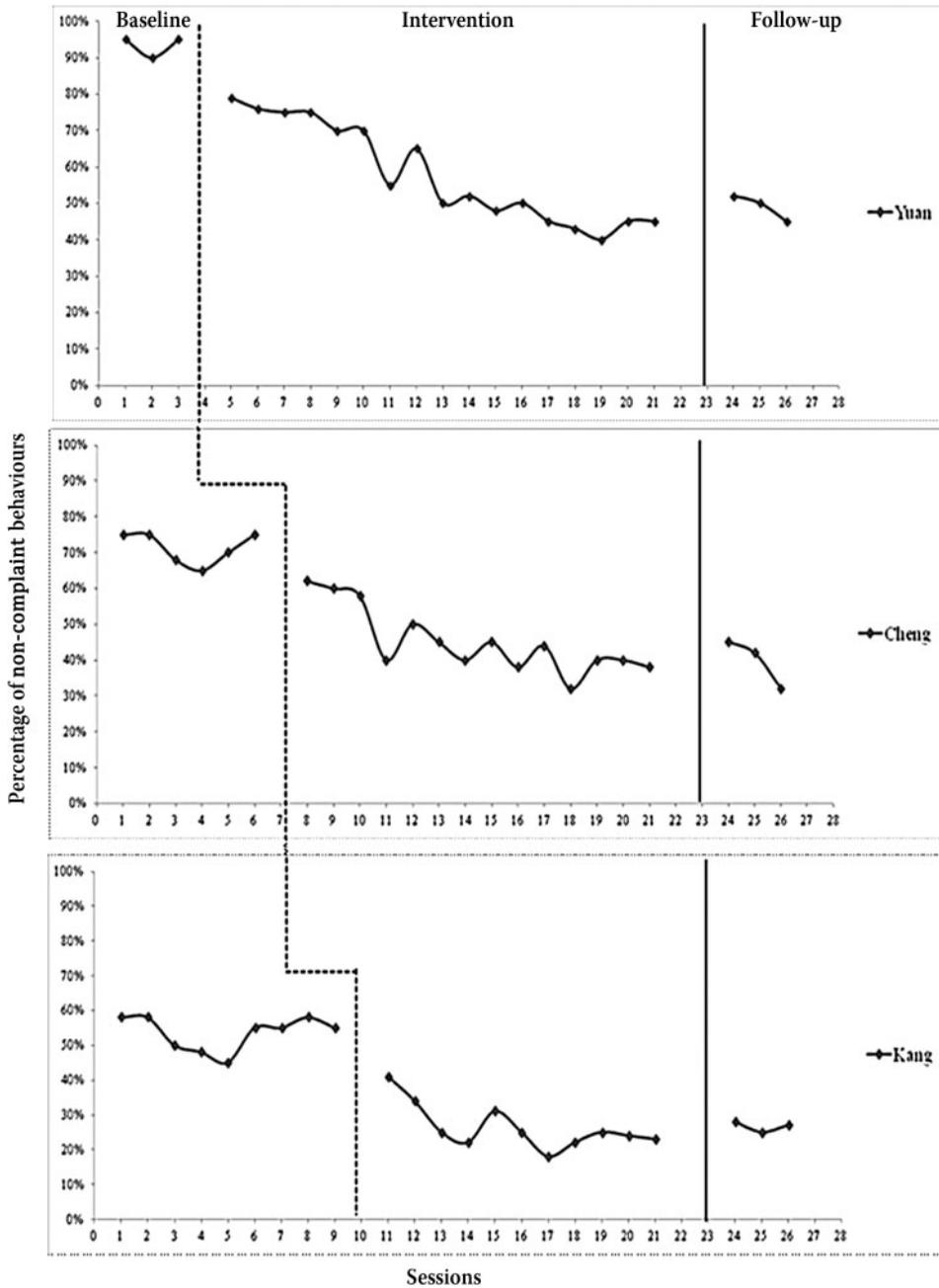


Figure 2. Percentage of non-compliant behaviours.

TEI-SF

The TEI-SF includes items designed to assess families’ willingness to use this treatment, beliefs about treatment effectiveness and acceptability of using the treatment. Table 6 shows the families’ ratings on the TEI-SF. The average number of points at the baseline was 33, indicating that the participating families’ responses mainly ranged between

Table 4. PSI-SF total scores.

	Percentile	Yuan	Cheng	Kang
Total stress	Baseline	88	83	63
	Follow-up	72	72	58

Table 5. PSI-SF percentile scores in three domains.

	Percentile baseline			Percentile follow-up		
	<i>Domains</i>					
	Parental distress	Parent-child dysfunction	Difficult child	Parental distress	Parent-child dysfunction	Difficult child
Yuan	80	85	90	65	70	80
Cheng	77	82	85	70	75	70
Kang	65	58	55	65	50	40

Table 6. Ratings of TEI-SF.

Participating families	Acceptability points	
	Baseline	Follow-up
Yuan's father	36	45
Cheng's grandma	30	40
Kang's grandma	34	45

“neutral” and “agree.” Upon implementation of treatment, the average scores were 43, indicating that after treatment, ratings of the acceptability of the PBIS improved to the maximum level possible. The results supported that the PBIS programme involving families and outcomes was acceptable and effective.

Discussion

Current education policies and practices have resulted in increased numbers of families of children with disabilities' being included in the service delivery process (Chen 2011; S.-P. Hsu 2008; McLaughlin et al. 2012). This study contributes important information to the field of early childhood special education, specifically involving families in the intervention as the foundation of improving outcomes for children with disabilities. Overall, visual examination of the data highlights improvements in off-task and non-compliant behaviours across participants. The PSI-SF indicated the decreased scores in stress levels across participating families from pre- to post-intervention. Moreover, two out of three families' beliefs about the acceptability of the PBIS approach improved to nearly the maximum level possible by the end of the study.

As discussed previously, focusing on the behavioural and social-emotional development of young children is critical, particularly if we attempt to intervene early to halt a negative behavioural cycle and keep the achievement gap from widening (Benedict,

Horner, and Squires 2007; Hojniski and Missall 2006). Although the intervention took place in a separate room from the regular classroom, an improvement trend in the data indicates continued effectiveness of the PBIS approach throughout the follow-up phase, supporting the effectiveness of the intervention when maintained in inclusive classrooms. Data also revealed that three participating children gradually decreased targeted behaviours in the classroom settings during the intervention phase. Following implementation in different settings, it is interesting to note, children in the current study appeared able to almost instantaneously recognise the consequences of their behaviours and regulate their actions. For example, when entering the classroom, Yuan and Cheng frequently commented to others, 'I will complete tasks first and then go to play'. On the other hand, compared to other participants, Kang did not show high levels of off-task and non-compliant behaviours in the baseline phase, but after intervention, the improvements in behaviours were a clear change in the levels for all participating children. Previous research (e.g. Lucyshyn et al. 2007) has shown the efficacy of the PBIS approach with children with autism and their families, and this study revealed that such an approach could be an effective intervention for children with other types of disabilities. Therefore, there continues to be an increasing need for evidence-based behaviour-support strategies in order to more effectively manage disruptive behaviours in the classroom. The effective management of behavioural problems can assist early childhood educators in moving one step closer to the goal of improving behaviour and preparing children for increased learning (Carter and Van Norman 2010; Gettinger and Stoiber 2006).

A collaborative partnership is emphasised in the PBIS approach (Chu and Wu 2012; Binnendyk and Lucyshyn 2009; Blair et al. 2011; Carr et al. 2002; Lucyshyn et al. 2007; Wang, McCart, and Turnbull 2007). Although there were limitations in implementing the intervention in the children's home settings, the collaboration process helped these families create positive behaviour changes in their children. During the initial home visit, it was observed that the families tended to use punishment (e.g. verbal reprimand) to correct their children's non-compliant behaviours. But during the follow-up home visit (after the intervention), the researcher observed that families used positive strategies (e.g. reinforcement, specific directions instead of scolding their children) and had started to understand the concepts of the behavioural techniques that were addressed during parent training process. For example, Yuan's father said, 'I think the function of behaviour is to escape from work, and I tried to ignore Yuan's complaining'. During the PBIS implementation process, a collaborative partnership in which families and professionals share the responsibilities to conduct functional assessments and design the behaviour-support plan is a critical component (Binnendyk and Lucyshyn 2009; Lucyshyn et al. 2007; Wang, McCart, and Turnbull 2007). Reflecting on a meaningful lifestyle outcome as one of the core areas of the PBIS approach (Binnendyk and Lucyshyn 2009), families who were involved in their children's educational process might produce long-term improvements to the quality of life of their children.

Research has found that parents struggle with accessing and utilising evidence-based practices for intervening in problem behaviours in young children (Chu and Wu 2012; Epley 2009). Without adequate knowledge of techniques for intervening in the problem behaviours, professionals and families may respond to the disruptive children by providing less instruction and fewer instances of positive feedback, causing these children to 'learn less and attend less' (Raver and Knitzer 2002, 3). Although implementing behavioural techniques requires more training and resources than most parents have available, the current study aimed to assess the effectiveness of involving families by providing access to PBIS services. In other words, this programme targeted

children's disruptive behaviours directly through the professional component (i.e. providing intervention using evidence-based practices and behavioural techniques) and indirectly through the parent component (i.e. the emphasis on PBIS concepts that parents could understand and implement to improve family-professional collaboration). The improved scores of social validity on the TEI-SF measure corresponded to families' pursuing evidence-based PBIS as a treatment for their children. In the baseline phase, families marked "agree" in response to most questions of the TEI-SF measure, but most families marked "neutral" when considering the procedures used in this treatment. Once this treatment involving families was implemented, they received information about identifying proactive and reactive strategies aligned with the functions of off-task and non-compliant behaviours, and they changed their responses to the question about procedures used in this treatment to 'agree' or 'strongly agree'. Overall, it was found that families perceived the goals, procedures and outcomes to be acceptable, feasible and satisfactory.

Family characteristics have a significant impact on the development of children's behavioural problems. Families experiencing high levels of stress are often the ones characterised as having children with disruptive behaviour disorders (Spratt, Saylor, and Macias 2007). The data collected from the PSI-SF did not show that participating families exhibited higher levels of stress, perhaps because participants' disruptive behaviours may not be significantly more severe than those of samples in the previous studies. Another reason may be that these participating families tend to actively seek assistance or are offered assistance from social welfare agencies. In addition, the families' scores fell in the normal range for "total stress" and in the domain of "difficult child" on the PSI-SF measure, with Yuan being the exception. According to findings of previous studies, raising children with autism is more stressful on parents than raising either typically developing children or children with other disabilities. Although all participants' PSI-SF scores showed a decrease in stress ratings in the follow-up phase, whether this programme has a positive impact on reducing parental stress level is inconclusive.

Limitations

There were several limitations in this study. First, a continuous threat to validity in single-subject designs is the small sample size. In this study, that threat was exemplified by having only three participants; findings are based on participant characteristics. Specifically, these participants were recruited from one city in Taiwan. The findings cannot be generalised to all Taiwanese children with disabilities who exhibit off-task and non-compliant behaviours. In addition, there was a weakness in the analysis of generalisation. The collection of generalisation data was limited. Although the families considered the school setting as a priority, it could have been beneficial to extend data collection to the home settings to determine the sustainability of skills over a longer period of time. Third, this study did not control threats to confounding variables, such as receiving services from other professionals or in-home intervention programmes. For example, Yuan received continuous intervention services at home two times per week, while Cheng and Kang did not. Although this study did not compare the effects of such intervention programmes on each targeted child's performance, the levels of intensity of intervention might be a confounding factor that warrants further attention.

Future directions

Despite the fact that the evidence showed the effectiveness of home-and-school collaboration on interventions for decreasing disruptive behaviours, it is unknown whether families actually ascertained the concepts of PBIS for their children. Specifically, behavioural consultation was provided throughout the whole study; however, we do not know for whom consultation was effective or what factors in the home environment may have impacted treatment effectiveness. In other words, further research is necessary to investigate the effectiveness of implementing the evidence-based behavioural techniques within professional consultation at home.

Positive behaviour support is a data-driven approach that can assist in the management of problem behaviours within the classroom. In the current study, the data in both intervention follow-up phases showed clear collateral advantages to using the PBIS approach, although no intervention was implemented in the classroom settings. Future research is suggested to investigate the generalisability of study results, specifically when implementing in a group format. Given a higher student–teacher ratio in the classroom setting and difficulty in finding qualified personnel to deliver one-to-one instruction, additional study is needed to evaluate the effectiveness of group instruction using positive behaviour support. Utilising a group format may increase generalisation and social advantages.

In summary, this study suggests that coordinating closely with professionals and involving families in the intervention may lead to more pronounced and generalised benefits. Working with families can help lay the foundations for school success and a positive school–family relationship, which may result in correlated gains in children’s learning outcomes.

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