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ORIGINAL PAPER

Child-Oriented or Parent-Oriented Focused Intervention: Which is the Better Way to Decrease Children's Externalizing Behaviors?

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Abstract Research has tried to identify risk factors that increase the likelihood of difficulties with externalizing behavior. The relations between individual or environmental factors and externalizing behavior have been especially documented. Child-oriented and parent-oriented interventions have been designed in order to decrease externalizing behavior in preschoolers. To date, however, research has largely been compartmentalized. It is therefore not known whether child-oriented or parent-oriented intervention is more effective in reducing externalizing behavior. The aim of the current study was to answer this question by comparing two 8-week child with two 8-week parent-oriented group programs sharing a common experimental design. This was done in a pseudo-randomized trial conducted with 73 3–6-year-old children displaying clinically relevant levels of externalizing behavior who were assigned to one of the four interventions and 20 control participants who were allocated to a waiting list. The results indicate that the four programs focusing on a specific target variable, i.e., social cognition, inhibition, parental self-efficacy beliefs, or parental verbal responsiveness, are all effective in reducing externalizing behavior among preschoolers. Their effectiveness was moderated neither by their orientation toward the child or the parent nor by their content, suggesting that several effective solutions exist to improve behavioral adaptation in preschoolers. A second important highlight of this study is that, thanks to comparable effect sizes, brief focused programs appear to be a reasonable alternative to long multimodal programs, and may be more cost-effective for children and their families.

Keywords Social cognition · Executive functions · Self-efficacy beliefs · Verbal responsiveness · Externalizing behavior · Preschoolers · Training · Intervention

Introduction

Externalizing behavior (EB) has been conceptualized as uninhibited behavior and related expressions of under-socialization in which negative emotions are directed against others and manifested as anger, aggression or frustration (Batum and Yagmurlu 2007; Bongers et al. 2004; Campbell et al. 2000). A certain level of EB is considered to be typical in preschoolers (Wakschlag et al. 2007), but persistent high levels of EB may impede children's social adjustment, increasing the risk of poor mental health issues in adolescence and adulthood (Miner and Clarke-Stewart 2008; Reef et al. 2011). Research has therefore tried to identify risk factors that potentially increase the likelihood of EB.

Explanations for behavioral problems in preschoolers have been put forward from the theoretical framework of social cognition, in particular models such as social information processing and theory of mind. According to these, children gradually become able to recognize desires and emotional expressions, to predict emotions according to social situations or social behavior according to felt emotions, and to adopt other people's visual perspective and understand their beliefs or false beliefs (Deneault and Ricard 2013). The more children gain an understanding of

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mental states, the better adapted their social behaviors become (Denham et al. 2003). Conversely, deficits in the recognition of mental states could be responsible for behavioral problems, because of bias in the way children perceive social situations (Eisenberg et al. 1997; Spinrad et al. 2006). In addition, the social information processing model explains how children cognitively process critical social situations such as provocation or conflict and how they solve problems (Crick and Dodge 1994). In a critical social situation, six steps are mobilized: children encode others' social cues (1) and interpret them (2), clarify goals (3), access possible responses or build a response (4), make a response decision (5), and enact the behavior (6). In children displaying EB, deficits are postulated in each of the six steps of social information processing (Dodge and Pettit 2003). Hostile attribution biases formed in the second step have for example been reported in aggressive children (Crick and Dodge 1996).

Another relevant explanation for behavioral problems in preschoolers derives from neuropsychological theories. According to this approach, executive functions, and in particular inhibition capacities, are necessary to regulate behavior in social situations as well as to control impulsive behaviors. For example, good inhibition capabilities are needed for children to restrain themselves from touching attractive toys in a shop or to wait their turn when playing a game. Executive functions develop through childhood and become mature in adolescence, but the most significant growth occurs in the preschool period (Dowsett and Livesey 2000). Correlations between preschoolers' EB and executive functioning, in particular inhibition, have been identified in previous research (Pauli-Pott and Becker 2011; Schoemaker et al. 2013). Children with EB have also been found to show deficits in executive functioning compared with a control group (Schoemaker et al. 2014; Youngwirth et al. 2007).

Consistently with these explanations, child-oriented interventions have been designed with the aim of reducing EB in children. Some of these focus on the child's social cognition. Among the most famous are the PATHS (promoting alternative thinking strategies), a school-based prevention curriculum aimed at reducing behavioral problems by enhancing socio-emotional competencies in children (Domitrovich et al. 2007), and the Dinosaur School training course which is part of the Incredible Years program (Webster-Stratton et al. 2001). Their effectiveness has been tested in evidence-based studies, which demonstrate that working on children's cognition could be beneficial in lowering their EB level. For example, the Dinosaur School training course (Webster-Stratton et al. 2001) addresses interpersonal difficulties such as conflict resolution skills, negative attributions, or inability to understand other people's perspective. The training is implemented weekly in groups of five or six children, and consists of 18–22 sessions. The effectiveness of such child-oriented programs has been reported for preschoolers displaying early-onset conduct problems. Parents' reports of their children's EB showed a greater decrease of EB in the intervention than in the control groups over the 6-month program period, with a medium effect size of $d = .35$. More recently, other programs have been designed to train preschoolers' cognitive functions (inhibition, memory, attention, hand-eye coordination, etc.) in order to observe their possible impact on EB (Halperin et al. 2013; Tamm et al. 2014). However, due to the absence of a control group, the possible effect of spontaneous improvement in these training programs cannot be completely excluded, especially at this very young age.

Existing child-oriented programs have several serious weaknesses. First, controlled-trial studies have demonstrated the effectiveness of these programs after the program, but not in follow-up assessments. Long-term effects have likewise not been confirmed in two previous meta-analyses (Beelmann et al. 1994; Gresham 1998). Second, only low to medium effect sizes have been reported in earlier studies (Beelmann et al. 1994; Webster-Stratton and Hammond 1997). Third, the targets of most of these programs are very broad (Halperin et al. 2013; Tamm et al. 2014). It therefore remains impossible to determine to which variables behavioral improvement is due. Fourth, many of these programs cannot be considered as pure child-oriented interventions, as parents and/or teachers are coached (Halperin et al. 2013; Tamm et al. 2014). They are taught how to do the work of the program leaders and how to reinforce the target cognitive and social skills at home or at school. Their inclusion is often necessary to counterbalance the final limitation of child-oriented programs, namely that the generalization of social skills or inhibition strategies outside the training setting may be limited. It may hence be difficult for young children to use cognitive or behavioral strategies learned in an artificial context with the therapist in diverse real-world conditions (Gresham 1995).

Beside child-oriented explanations, preschoolers' EB is regarded as related to problematic parenting in the social learning model (Dishion et al. 1995; Patterson 2002; Patterson et al. 1989; Snyder et al. 2003). In particular, negative cycles of interaction have been described in which EB may be more likely to emerge or persist when parents use inconsistent, unresponsive and over-reactive discipline that reinforces children's problematic behavior. In these negative cycles, parenting externalized children is often described by parents as challenging and less rewarding than with other children.

As a relevant explanation for behavioral problems in preschoolers, negative cycles of interaction have been described between child EB and parental self-efficacy beliefs

(Coleman and Karraker 2003; Meunier et al. 2011). High levels of positive beliefs have been found to predict supportive behaviors in parents (Jones and Prinz 2005; Leerkes and Crockenberg 2002; Meunier et al. 2011), which in turn encourage children's adjustment, while conversely low levels of positive beliefs tend to promote EB by increasing the use of controlling behavior (Brody et al. 1999; Shumow and Lomax 2002; Zimmer-Gembeck and Thomas 2010). In addition to such indirect influence, parental self-efficacy has been directly related to better adjustment in children of all ages (Ardelt and Eccles 2001; Coleman 2003; Jones and Prinz 2005). Strong empirical evidence has been provided for concurrent and longitudinal associations between high self-efficacy beliefs and children's behavioral adjustment, or conversely for low self-efficacy beliefs and EB (Janssens 1994; Jones and Prinz 2005; Junttila et al. 2007; Mouton and Tuma 1988; Oelofsen and Richardson 2006).

Other negative cycles of verbal interactions have been described in parent-child dyads. On the one hand, the literature has shown that a higher level of EB is frequently associated with poor communication skills (Gallagher 1999; Monopoli and Kingston 2012). Indeed, poor communication skills can cause behavioral problems, as difficulties in both understanding and producing verbal responses appropriate to the social context may lead to non-compliance and aggressiveness (Kaiser et al. 2000). And, behavioral difficulties can contribute to language problems, since children displaying such problems may be socially isolated and lack opportunities to practice their communicative abilities. On the other hand, parents' verbal responsiveness has been shown to predict early language learning (Hart and Risley 1995; Pungello et al. 2009; Vernon-Feagans and Bratsch-Hines 2013). Verbal responsiveness includes the importance of responding promptly, contingently and appropriately to the child's communication attempts: modeling of language use, labeling the environment, encouraging the child's communication attempts, and creating an interactive environment in which children can experiment with language (Tamis-LeMonda et al. 2001). The literature has highlighted the effectiveness of parent-based responsive language interventions, aiming to increase the caregiver's verbal responsiveness, on children with language or behavioral problems (Hancock et al. 2002). In these programs, parents learn to apply strategies during their daily routine with their child, aiming at being responsive and sensitive to the child's behavior at a level appropriate to his/her development. Such strategies often consist of following the child's lead, maintaining face-to-face interactions, balancing turn-taking, adapting vocabulary and grammatical structures to the child or using language modeling strategies. Previous research has shown that these interventions increase parents' verbal responsiveness, children's language development, initiative and behavioral engagement (Kong and Carta 2013; Roberts and Kaiser 2011). And verbal responsiveness was shown to facilitate children's emotion behavior (including positive and negative affect) and cognitive outcomes (Landry et al. 2006).

Consistently with the social learning model, parent-oriented interventions have been designed which aim to reduce EB in children. Among the most famous of them are the Triple-P (Positive Parenting Program) (Sanders and Markie-Dadds 1996), and the Incredible Years parenting program (Webster-Stratton 2005). Their effectiveness has been tested in numerous evidence-based studies, which consistently demonstrate that working on parenting variables is beneficial in lowering the level of EB in children (Bodenmann et al. 2008; Kaminski et al. 2008; Menting et al. 2013; Scott et al. 2012; Turner et al. 2006). Recent meta-analysis of 35 parenting programs designed to reduce preschoolers' EB reported an average large effect size of $d = .84$, which was not affected either by program duration or components or by participants' gender or EB at baseline (Mouton et al. revised).

However, these parent-oriented interventions have a serious weakness. They can be considered as multimodal interventions in which several parenting variables are stimulated together (Eisenberg et al. 2004; Roskam et al. 2015). The package usually encompasses cognitive aspects of parenting such as self-efficacy beliefs or stress as well as behavioral ones such as a wide range of childrearing practices or responsive attitudes. For example, in the Triple-P, several core parenting skills are stimulated, such as giving praise or showing attention to the child (behavioral aspects of parenting), and managing parenting stress (cognitive aspects of parenting) (Bodenmann et al. 2008; Sanders and Markie-Dadds 1996). These programs are therefore unable to inform us about the parenting variables that specifically impact on EB.

Research on the effectiveness of child-oriented or parent-oriented programs mainly remains compartmentalized, or relates to the effectiveness of combined parent and child programs (Drugli et al. 2007; Webster-Stratton et al. 2011, 2012). Only a very limited number of studies have been devoted to the comparison between child-oriented and parent-oriented interventions. These relate to the Incredible Years program, which encompasses training series not only for parents but also for teachers and children (Webster-Stratton 2005). The effectiveness of six-month training programs for children and one of their parents has been tested in relation to young children with conduct problems (Webster-Stratton et al. 2004). The results indicate that both interventions were effective in reducing children's conduct problems, although when mothers participated in the parent-training condition ($d = .67$), the effect size was greater than from the child-training condition ($d = .41$).

The aim of the current study was to compare the effectiveness of two child-oriented and two parent-oriented group programs in the reduction of EB among preschoolers. These four programs were compared in a pseudo-randomized trial conducted on a sample of 73 preschoolers displaying clinically relevant levels of EB. Three waves of measurement were completed, i.e. before the program, after the 8-week program and at 16-week follow-up. Based on existing literature, both child-oriented and parent-oriented interventions were expected to be effective in reducing preschoolers' EB, but effect sizes were expected to be greater in the parent-oriented programs (Webster-Stratton et al. 2004). For child-oriented programs, effectiveness analysis was expected to find a medium effect size whether the program focused on inhibition or social cognition, and short-term rather than long-term effectiveness (Beelmann et al. 1994; Gresham 1998). For parent-oriented interventions, effectiveness analysis was expected to find a large effect size whether the program focused on parents' self-efficacy beliefs or verbal responsiveness (Roskam et al. 2015).

Method

Participants

Data were collected from 73 children and their parents. To take part in the study, each of the children had to be 3–6 years old and to score in the borderline or clinical range for EB, i.e. with a score of 21 or higher on the externalizing scale of the child behavior checklist (CBCL) preschool form (Achenbach and Rescorla 2000). At baseline in the current study, children scored 29.01 on average (SD = 5.77). The average age of the children (66.7 % boys) was 4.32 years (SD = .83). The participants were Belgian and native French-speakers. All of the children attended normal schools in the French-speaking part of Belgium. A brief evaluation of IQ was carried out using two subtests of the WPPSI-III (Wechsler 2004): the block design subtest (for performance IQ) and the information subtest (for verbal IQ). These subtests have been found to correlate closely with the full-scale IQ (Anastasi and Urbina 1997). The average IQ standardized score of the children was 9.89 (SD = 2.59). In order to select children whose EB was the core mental health problem, children with intellectual disabilities (below 5.5) as well as gifted children (over 14.5) were excluded from the study.

The educational level of the parents was calculated as the number of years of education they had completed, counting from first grade onward. Some had completed 12 years, corresponding to the end of secondary school and compulsory education in Belgium (22.6 % of the mothers and 31.2 % of the fathers); others had completed 3 more years (corresponding to undergraduate studies) (28 % of the mothers and 24.7 % of the fathers); others had gained a 4-year degree or more (49.4 % of the mothers and 44.1 % of the fathers). Monthly incomes were less than €2000 for 9.7 % of the families, between €2000 and €3000 for 18.3 %, between €3000 and €4000 for 34.4 %, and higher than €4000 for 37.6 %. Note that in Belgium, the average monthly salary was €1984 (http://statbel.fgov.be).

Procedure

This study was approved by the Ethical Committee of the Psychological Sciences Research Institute of the University of Louvain in Belgium. Participants received small rewards for their participation in each phase of the study (i.e., museum tickets, small toys, or shopping vouchers provided by sponsors).

The parents were informed about the study through pediatricians, schools, a website, and a specially created Facebook page. They were invited to take part in an intervention study for children displaying hard-to-manage behaviors such as agitation, non-compliance, impulsivity, aggressiveness, or opposition. Parents who were willing to take part in the program were invited to complete an online questionnaire in which socio-demographic information and a preliminary assessment of their child's EB was collected. During the recruitment period lasting 3 months, a total of 194 parents were enrolled by completing the online questionnaire. One hundred and nineteen of them were excluded because the children's EB was not in the borderline or clinical range of the CBCL, or the children were less than 3 or more than 6 years old, or they displayed developmental problems or low IQ, or did not speak French. Participants who were excluded were oriented toward the regular mental health services. A total of 78 participants were assigned to one of the conditions. They were told they would be taking part in a longitudinal research study and signed an informed consent.

Baseline, post-test and 16-week follow-up data were collected at the university by extensively trained PhD students. Parents completed questionnaires assessing children's behavior, temperament, and CHAOS (Confusion Hubbub and Order Scale) (Dumas et al. 2005; Matheny et al. 1995). In order to reduce the waiting time between assignment and participation to intervention for all families, the first 22 participants to enroll were assigned to an 8-week waiting list resulting in a pseudo-random allocation. The next 56 participants were randomly allocated to the four 8-week interventions, i.e., two child-oriented and two parent-oriented training programs. After the 8-week period, participants assigned to the waiting list were allocated to one of the four training programs. Note that the informed consent signed by

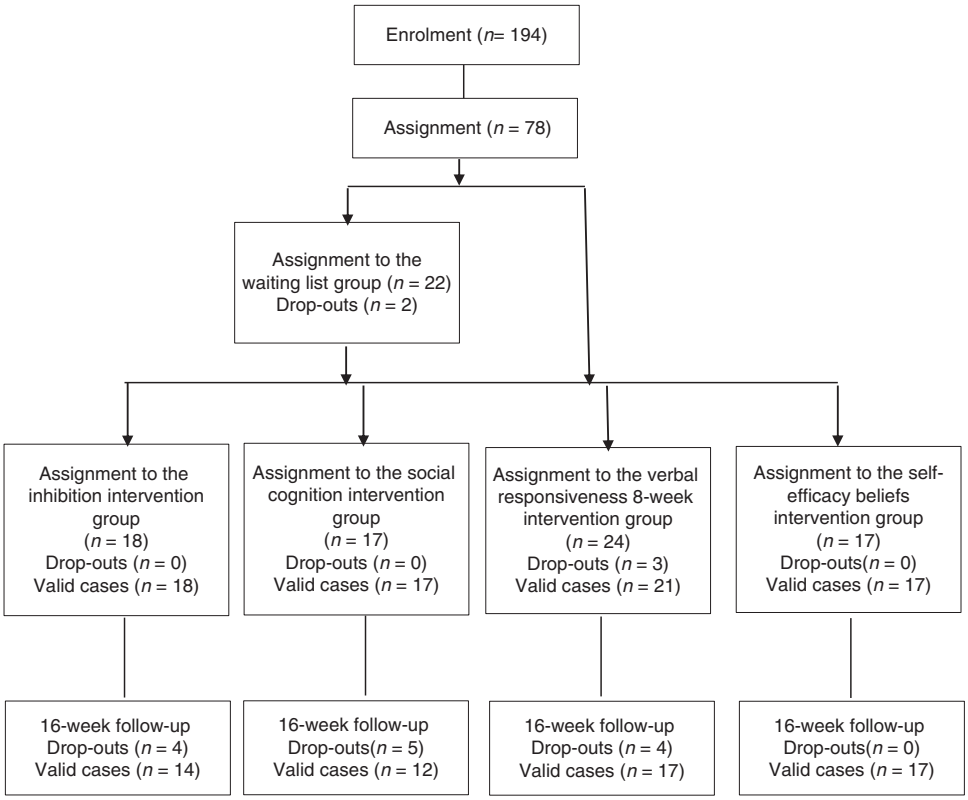

Fig. 1 Flow of participants through each stage of the study

the participants left them free to withdraw without having to give any justification. However, the participants who dropped out from the waiting list or the training groups mentioned reasons such as time constraints, parental separation, or health concerns. The pre-post waiting list control group design was chosen here mostly for ethical reasons. Although such a design prevents from comparisons at follow-up, it offers an alternative to families who would be left without any support otherwise. For these reasons, it is a commonly used design in parenting intervention research (Sanders et al. 2000). The flow of participants and drop-out through each stage of the research is shown in Fig. 1.

Except for the sessions' content, exactly the same procedure was followed in the four conditions. They lasted 8 weeks and were conducted by PhD students. A program delivery manual was created, setting out for each session standardized instructions for participants, a precise timetable, a description of activities and materials to be employed, standardized requests for clarification and recommendations on how to keep a neutral and open attitude and how to lead a group, in order to help the user to stay exclusively focused on the theme. In the two child conditions, children took part in eight 1.5-h weekly group training sessions with three or four participants. Due to the young age of the children, each training session consisted of two sections of 45 min each (total of 16 sections) allowing children to remain attentive. In the two parent conditions, the parents took part in eight 1.5-h weekly group sessions with ten participants in average.

Child-oriented programs

Two child programs were developed: one aiming to give training in social cognition, and the other focusing on inhibition. Children in the social cognition condition received training in social information processing and theory of mind competencies. The first seven sections dealt with theory of mind skills, and the following seven with social information processing competencies; the final session integrated all of the concepts. The intervention was based on a program which established a progression in the understanding of mental states (Howlin et al. 2011). The levels for emotions were: photographic facial recognition, schematic facial recognition, situation-based emotion, desire-based emotion, and belief-based emotions. For beliefs, the levels were simple perspective-taking, complex perspective-taking, seeing leads to knowing, true belief-action prediction, and false belief (Hadwin et al. 1996). The intervention was also based on the six steps of the social information processing model (Crick and Dodge 1994). The children were asked to help each other by completing other children's answers or correcting them, so as to induce socio-cognitive conflict (Bearison et al. 1986). Activities involved sequences of play, pictures, video extracts, puppets, story

reading, etc. Each session ended with a story dealing with an emotion, a false belief or a social problem-solving situation, providing an opportunity to talk about protagonists' mental states. In each activity, open-ended questions were asked to stimulate conversations and feedback was given after correct or incorrect answers. A complete description of the program is available in another published paper (Houssa and Nader-Grosbois 2016).

The inhibition intervention included exercises/games adapted to a very young age, and focused on the four components of inhibition: interruption of an ongoing response, impulsivity control, inhibition of a predominant response, and inhibition of external distractors. In addition, fictional characters were progressively introduced to the children to improve their metacognition of executive functioning. These characters were inspired by Reflecto (Gagné and Longpré 2004), an intervention method that uses metacognition by introducing eight characters, each with a different job representing one of the executive functions. Using this job metaphor makes possible the rapid activation of a set of mental representations already present in the child's repertoire. In the present study, children first "met" the *policeman* making a *stop* sign with his hand and learned a little song associated with him: "Stop: first I think and then I do". The policeman was involved in all exercises involving inhibition of a predominant response, reminding children not to give impulsive answers in the exercises. The second character was the *statue*, involved in each exercise in which children needed to control their body movements and stay calm. Finally, the *detective* allowed children to check their performance in each exercise, but also to spot possible errors in others' performances. Although the sessions were held for groups of three or four children, each child was active all the time thanks to the detective: if it was not his/her turn to answer, he/she was supposed to check the others' responses for mistakes. The children received continuous feedback on their performance through the characters. Some of the games were for the whole group (e.g., Simon says, freeze dance), while others were for pairs (e.g., day/night exercises). A complete description of the program is available in Volckaert and Noël (2015).

Parent-oriented programs

Two programs focused on the parents: one aiming to enhance parents' self-efficacy beliefs, and another focusing on their verbal responsiveness. The content of the intervention focusing on stimulating parents' self-efficacy beliefs was based on Bandura's social learning theory, assuming that self-efficacy should be considered not as a personality trait but rather as a context-dependent concept (Bandura 1977, 1982). This means that it can be manipulated, as shown in social psychology and sport studies (Coffee and Rees 2011). Social learning theory holds that self-efficacy beliefs are rooted in individual factors (e.g., personal history of accomplishment, emotional arousal, and its physiological impact) as well as in contextual factors (e.g., verbal feedback from others, social comparisons) (Bandura 1989). Performance accomplishments are the strongest source of self-efficacy, followed by vicarious experience (an evaluation process based on seeing others with widely differing characteristics perform), verbal persuasion, and emotional arousal (Bandura 1977). In parenting, self-efficacy beliefs are therefore expected to depend on parents' past and actual experience with their children (successes and failures) and on the emotional arousal this experience may induce. Feedback from others (in particular comments from relatives, teachers, doctors, friends, etc.) and social comparison with other parents are also major contributors to self-efficacy. The content of the program was as follows: What kind of parent am I? (session 1); Having a positive representation of my child (session 2); Being comfortable with praise (session 3); To what extent does my child make me feel competent or not? (session 4); Talking to others about my child to receive feedback about me as a parent (session 5); Thinking about me and my child (session 6); Self-evaluation through video feedback based on baseline observation of the participants (sessions 7 and 8). A complete description of the program is available in another published paper (Roskam et al. 2015).

The program focusing on enhancing verbal responsiveness was based on the social interactionist perspective. To support child development, the caregiver should use utterances that reflect the child's focus of attention and should adapt his/her language to the child's stage of development (Brassart and Schelstraete 2015b). This framework supports language learning by assisting the child in mapping his/her knowledge and social intention with spoken language (Bruner 1975; Yoder and Warren 1993). The content of the program was as follows: Information about the importance of communication skills for children's behavioral outcomes and of parent-child interaction in developing such skills (session 1); Contingent responses to children's communication attempts in a warm and sensitive manner (session 2); Learning responsive strategies such as repeating back, interpreting, descriptive talking and requests for clarification (session 3); Balancing turn-taking and using open-ended questions (session 4); Simplifying vocabulary and utterances, giving enough information to the child, suggesting rather than ordering, and using verbal praise (session 5); Video feedback based on baseline observation of the participants, with positive reinforcement of responsive parenting behaviors by the speech-language therapist (sessions 6 and 7); Learning strategies promoting children's communication skills such as recasting, expanding, labeling

and prompting (session 8). A complete description of the program is available in another published paper (Brassart and Schelstraete 2015a).

Measures

Children's behavior was evaluated with the preschool version of the CBCL covering ages 1.5–5 years (Achenbach et al. 1987; Achenbach and Rescorla 2000). The EB scale encompasses attention problems and aggressive behavior scales. The internalizing behavior scale encompasses the emotionally reactive, anxious-depressed, somatic complaints, and withdrawn syndrome scales. CBCL provides 3-point Likert scales: "not at all present", "moderately present", or "often present". Scores are computed in each scale by summing item scores. The psychometric properties of the initial version of the scale were good, with an α of .92 for "externalizing problems" and of .89 for "internalizing problems" (Achenbach and Rescorla 2000). Similar psychometric properties have been reported for the French version.

Child temperament was measured with the Colorado Childhood Temperament Inventory (Rowe and Plomin 1977), a 30-item questionnaire designed for 1–6-year-old children. It encompasses five scales, i.e., sociability, emotionality, activity, attention span persistence, and soothability. All items were rated by parents with Likert-type scales ranging from 1 (not at all like the child) to 5 (a lot like the child). Internal consistency was reported to be good, with Cronbach's alphas ranging from .73 to .88 and test-retest reliabilities of $r = .43$ to .80.

CHAOS is a measure of "environmental confusion and disorganization in the family", i.e. high levels of noise, crowding, and home traffic, in children's development (Matheny et al. 1995). It was assessed by parents with a 15-item questionnaire. Example of items are: "We can usually find things when we need them" or "The atmosphere in our home is calm". Based on current usage, a single score was derived from the CHAOS questionnaire to represent the parent's report of home characteristics, corresponding to the simple sum of responses for the 15 items. The true or false responses were scored so that a higher score represented more chaotic, disorganized, and time-pressured homes. Cronbach's alpha for the 15 CHAOS items was .79. The test-retest stability correlation for the total CHAOS score was .74. CHAOS was also reported to be correlated to parents' educational level and socio-economic status (Matheny et al. 1995).

Data Analyses

Preliminary analyses were first conducted to ensure comparability between the participants assigned to the waiting list and those immediately assigned to one of the four intervention conditions. The two groups were compared with one-way analysis of variance (ANOVAs) and the χ^2 test according to socio-demographic data, baseline level of child's EB, CHAOS, and temperament. Other preliminary analyses were conducted to ensure the comparability between the participants assigned to the child-oriented or parent-oriented intervention and to the four intervention conditions.

Next, we verified the effectiveness of the intervention conditions compared to the waiting list condition. We also verified that the interventions' effectiveness was specific to EB problems, in other words that effectiveness was demonstrated for EB rather than for internalizing behavior. To do this, we conducted repeated-measures ANOVAs, with time (baseline vs. 8 weeks later) as the two-level within-subjects factor and the EB and internalizing behavior scores as the dependent variables. Based on formal power calculation, to detect a reduction in IB or EB with 5 % significance level, 2 groups and 2 waves of data collection, a sample total sample of 54 was necessary (Faul et al. 2007).

The main analyses in our study were devoted to the developmental course of EB among the 73 preschoolers who attended a program. They were conducted using a multilevel modeling (MLM) framework with the HLM 7 software (Raudenbush et al. 2012). MLM capitalizes on the multilevel structure of the data, providing information about the variability of individuals over time (level 1, repeated measures) as well as between individuals (level 2) (Raudenbush and Bryk 2002). Because attrition is common in longitudinal data, MLM estimates are based on all the available data but without imputing data (McCartney et al. 2006). HLM uses the maximum likelihood estimation, which does not require the assumption of missingness completely at random (Little 1988). This method was chosen because it allowed the inclusion of parents who did not participate at each measurement point in the study sample. In our sample, missing data do not pose a great threat. Statistical comparisons between participants who dropped out and those who completed the three waves revealed no systematic significant differences in either socio-demographic variables or the variables under investigation. Also, no significant differences in drop-out rates were found at post or follow-up between the four conditions.

In the first model, we tested whether changes in EB were predicted by the participants' allocation to the child-oriented interventions vs. the parent-oriented interventions. Children's EB at baseline, after the intervention and at 16-week follow-up was entered at level 1 and the group allocation was entered at level 2 as the predictor of slope. Based on formal power calculation, to detect a reduction in

EB with 5 % significance level, 2 groups and 3 waves of data collection, a sample total sample of 44 was necessary (Faul et al. 2007). In the second model, we tested whether changes in EB were predicted by the participants' allocation to one of the four interventions. Children's EB at baseline, after the intervention and at the 16-week follow-up was entered at level 1 and the group allocation was entered at level 2 as the predictor of slope. Based on formal power calculation, to detect a reduction in EB with 5 % significance level, 4 groups and 3 waves of data collection, a sample total sample of 60 was necessary (Faul et al. 2007). As a complement, effect sizes were computed for each of the four interventions between baseline and after intervention or follow-up as well as between baseline and follow-up. Finally, to test the extent to which child gender, age at baseline, IQ, temperament, EB level at baseline, and CHAOS were related to EB slope, the three EB measurement points were entered at level 1 and the predictors of slope at level 2.

Results

One-way ANOVAs indicated that the participants assigned to the waiting list were comparable to those assigned to interventions with regard to children's age, mothers' and fathers' educational level, income, CHAOS, externalizing and internalizing behavior at baseline, and temperament. Also, both groups contained 66.6 % boys. Descriptive statistics and the results of ANOVAs are presented in Table 1.

One-way ANOVAs indicated that the participants assigned to child-oriented vs. parent-oriented interventions were comparable with regard to children's age, mothers' educational level, incomes, CHAOS, EB at baseline, and temperament. However, significant differences between groups were found for fathers' educational level and children's internalizing behavior. Also, the child-oriented groups tended to contain slightly more boys than the parent-oriented groups, with 54.28 and 76.31 %, respectively, $\chi(1) = 3.93$, $p < .05$. Descriptive statistics and the results of ANOVAs are presented in Table 2.

The decrease in EB was found to be higher among participants who benefited from an intervention compared to those on the waiting list. ANOVA for repeated measures identified a main effect of time, $F(1.91) = 24.77$, $p < .001$ as well as an interaction effect between time and group (waiting list vs. intervention), $F(1.91) = 5.36$, $p < .05$. The effect size was medium in the waiting list condition, with $d = .40$, but large in the intervention condition, with $d = .88$. The interaction effect is presented in Fig. 2. A similar analysis was conducted with internalizing behavior as an outcome in order to ensure that interventions specifically targeted EB. ANOVA for repeated measures displayed a main effect of time, $F(1, 91) = 10.64$, $p < .001$ but no interaction effect between time and group (waiting list vs. intervention), $F(1, 91) = .19$, $p > .05$. The effect size was medium in the two groups, with $d = .32$ in the waiting list

Table 1 Means (M) and standard deviations (SD) of socio-demographic data, CHAOS, IQ, behavior in baseline, temperament of participants in the waiting list or intervention conditions

	Waiting-list		Intervention		
	M	SD	M	SD	$F(1.92)$
Child's age	49.25	10.79	52.59	9.73	.83
Mother's educational level	5.45	1.50	5.43	1.55	.10
Father's educational level	5.3	1.49	5.13	1.55	.00
Incomes	7.55	1.70	7.29	1.90	.28
CHAOS	7.15	2.58	6.37	2.94	.15
IQ	9.89	2.27	9.90	2.61	.01
Externalizing behavior	29.80	5.43	28.79	5.87	.09
Internalizing behavior	6.10	3.94	5.26	2.84	2.36
Sociability	3.48	.82	3.44	.85	.17
Activity	3.88	.59	3.78	.70	.19
Emotionality	3.61	.63	3.57	.71	1.33
Soothability	2.51	.67	2.45	.62	.30
Attention	2.80	.70	2.71	.84	.48

Table 2 Means (M) and standard deviations (SD) of socio-demographic data, CHAOS, IQ, behavior in baseline, temperament of participants assigned to the child-intervention vs. parent-intervention conditions

	Child-oriented		Parent-oriented		
	M	SD	M	SD	$F(1.92)$
Child age	53.00	9.92	52.21	9.67	.12
Mother's educational level	5.42	1.41	5.44	1.68	.00
Father's educational level	4.76	1.44	4.57	1.58	3.98*
Incomes	7.32	1.96	7.26	1.86	.02
CHAOS	6.37	3.12	6.36	2.84	.00
IQ	9.67	2.60	10.10	2.64	.49
Externalizing behavior	29.57	6.33	28.07	5.41	1.17
Internalizing behavior	6.00	2.79	4.57	2.74	4.79*
Sociability	3.30	.82	3.56	.87	1.69
Activity	3.65	.69	3.90	.70	2.34
Emotionality	3.63	.70	3.52	.73	.50
Soothability	2.52	.61	2.40	.63	.66
Attention	2.63	.85	2.79	.83	.68

*$p < .05$

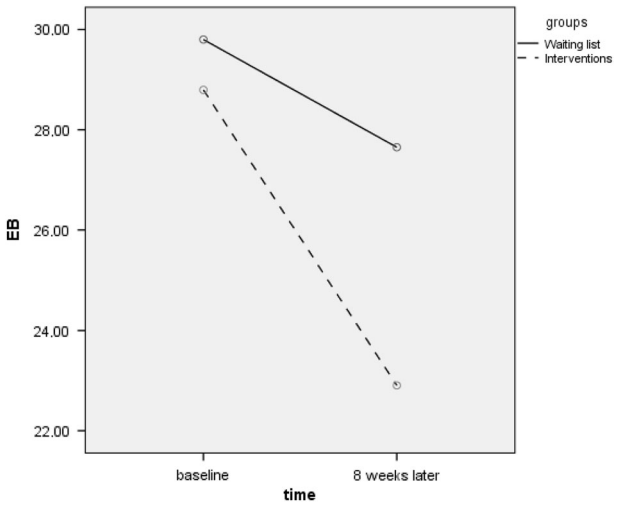

Fig. 2 Interaction effect between time and group allocation in the waiting list and intervention conditions

condition and $d = .47$ in the intervention condition. Descriptive statistics are presented in Table 3.

The first main model aimed to study the change in EB over the course of the study for participants who benefited from a child-oriented vs. parent-oriented intervention. A significant reduction of EB problems was found over time, but no influence of group allocation on EB slope, suggesting that the child-focused and parent-focused training programs produced a similar reduction in preschoolers' EB. Descriptive statistics are presented in Table 3 and the results of the HLM conditional models of child-oriented vs. parent-oriented group allocation predicting change in preschoolers' EB are presented in Table 4.

The second model aimed to test the influence of group allocation to the four intervention conditions on change in EB over the course of the study. This analysis found a similar decrease of EB over time irrespective of group allocation, suggesting that none of these four programs was significantly more effective than the others. Descriptive statistics are presented in Table 3 and the results of the HLM conditional models of intervention group allocation predicting change in preschoolers' EB are presented in Table 4. The effect sizes for each of the four interventions between the three waves are presented in Table 5.

The third model, including socio-demographic data and children's characteristics as predictors of EB slope, indicated a significant effect of EB level at baseline as well as of emotionality. For every unit above the average level of child EB at baseline, there was a decrease of 0.23 units of EB over a wave. For every unit above the average level of child emotionality, there was an increase of 1.17 units of EB over a wave. In other words, children with higher levels of EB at baseline or those displaying lower levels of emotionality benefited more from intervention than those with lower EB

Table 3 Means (M) and standard deviations (SD) of behavior in baseline, after intervention and at follow-up according to assignment conditions

		Externalizing behavior		Internalizing behavior	
		M	SD	M	SD
Waiting list	Baseline	29.80	5.43	6.10	3.94
	After waiting period	27.65	6.12	5.10	2.91
Intervention	Baseline	28.79	5.87	5.26	2.84
	After intervention	22.90	7.38	3.95	2.73
Child intervention	Baseline	29.57	6.33	6.00	2.79
	After intervention	23.08	8.58	4.01	2.73
	Follow-up	23.42	7.78	4.42	1.83
Parent intervention	Baseline	28.08	5.41	4.57	2.74
	After intervention	22.73	6.19	3.89	2.76
	Follow-up	21.63	5.90	3.24	2.35
Social cognition	Baseline	30.52	6.13	6.58	2.64
	After intervention	25.47	8.13	5.00	3.06
	Follow-up	25.33	7.87	4.91	1.44
Inhibition	Baseline	28.66	6.55	5.44	2.89
	After intervention	20.83	8.61	3.08	2.05
	Follow-up	21.78	7.59	4.00	2.07
Self-efficacy	Baseline	26.88	5.20	3.82	2.65
	After intervention	24.05	6.53	3.47	2.78
	Follow-up	19.70	5.30	2.88	2.20
Verbal responsiveness	Baseline	29.04	5.50	5.19	2.73
	After intervention	21.66	5.84	4.23	2.77
	Follow-up	23.68	5.97	3.62	2.52

Table 4 Results of the HLM conditional models

Fixed effects	Model 1 Estimate (SE)	Model 2 Estimate (SE)	Model 3 Estimate (SE)
Level 1			
Time	−2.37 (1.09)*	−2.13 (1.07)*	−2.19 (.73)**
Level 2			
Group allocation	−.63 (.62)	−.34 (.28)	
Gender			−.65 (.44)
Age			−.02 (.02)
IQ			.03 (.09)
EB at baseline			−.23 (.04)***
Sociability			.11 (.24)
Activity			.17 (.35)
Emotionality			1.17 (.29)***
Soothability			.06 (.32)
Attention			−.35 (.30)
CHAOS			.01 (.06)
Deviance	1332.76	1333.93	1291.46

*$p < .05$, **$p < .01$, ***$p < .001$

Table 5 Effect sizes for each of the four intervention groups between the three waves

Groups	Baseline-after intervention	Baseline-follow-up	After intervention-follow-up
Social cognition	.87**	.80*	ns
Inhibition	1.12***	.91**	ns
Self-efficacy	.61*	1.15***	.62*
Verbal responsiveness	.95***	.81**	ns

*$p < .05$; **$p < .01$; ***$p < .001$; *ns* non-significant

levels at baseline or with higher emotionality. Descriptive statistics are presented in Table 3 and the results of the HLM conditional models of socio-demographic data and children's characteristics predicting change in preschoolers' EB are presented in Table 4.

Discussion

The main goal of the current study was to compare the effectiveness of two child-oriented and two parent-oriented group-focused interventions in reducing EB among preschoolers displaying clinically relevant level of EB. The current study overcame several shortcomings from previous research on EB programs. First, it enabled a direct comparison between the two major kinds of intervention for preschoolers' EB: child and parent training programs. Also, it addressed specific shortcomings of previous research into both child-oriented and parent-oriented programs. Both child-oriented interventions focused on a specific target: social cognition in one and inhibition capacities in the other. The rationale for focusing on these targets was based on recent quasi-experimental studies showing that the provision of training in these areas to typically developing preschoolers led to a greater decrease in EB than that observed in controls attending handicraft sessions (Houssa and Nader-Grosbois 2016; Houssa et al. 2014; Volckaert and Noël 2015). The two child-oriented interventions can be considered as genuine child-oriented training programs, since parents were not involved or coached by the program leaders. With regard to parent-oriented interventions, the current study tested the effectiveness at decreasing EB of two parent-oriented programs each of which focused on a specific aspect of parenting, i.e., self-efficacy beliefs or verbal responsiveness. As with the child-oriented interventions, the rationale for focusing on these specific aspects of parenting relied on recent micro trials showing that improving self-efficacy beliefs or verbal responsiveness helps reduce preschoolers' EB (Brassart and Schelstraete 2015a; Mouton and Roskam 2015). Finally, the long-term effect of both child-focused and parent-focused interventions was tested in a 16-week follow-up measurement. In sum, the strength of the current study was its rigorous comparison of the effects of four interventions (child-oriented or parent-oriented) which related to specific targets, with a common experimental design in terms of recruitment of participants, duration of the program, baseline, pre-tests and post-tests, and follow-up measures.

As a main result, all interventions were seen to be effective at decreasing child EB. The specificity of this finding is reinforced by the fact that no significant effect was reported for internalizing behavior. Also, EB decreased similarly following child-oriented and parent-oriented interventions. To the best of our knowledge this is the first direct comparison between genuine child-oriented and parent-oriented training aimed at reducing preschoolers' EB. The results also reveal that although their components were very different and focused on specific targets, the decrease in EB was not predicted by the delivery content of the four programs under consideration. Such a result is somewhat surprising or even disappointing for the program designers. However, in the absence of a program content effect, the current results suggest that several effective solutions exist for improving behavioral adaptation in preschoolers. This is very good news for those parents who are not ready, willing or able to attend a parent-oriented program. Some may not regard such a program as relevant, while others are too busy with family and work commitments and unable to find the time to attend training. It is therefore necessary to propose an alternative form of intervention focusing on their child (Webster-Stratton and Hammond 1997). The absence of a program content effect is also good news for children who are particularly uncooperative and hence unable to benefit from immediate training. Parent-focused training is an effective alternative in such circumstances.

How can we explain that both child-oriented and parent-oriented interventions are effective? Our results suggest that a decrease in EB can be obtained through several change processes. In child-oriented interventions, the change process relies on enhancing children's social cognition or inhibition capacities. Thanks to a greater ability to understand and resolve critical social situations such as conflict, or a greater ability to control impulsive misbehaviors, trained children tend to have positive interactions with parents, teachers and peers. This in turn reinforces the probability that the children will continue to use their new skills. Transactional positive cycles are thought to result from children's behavioral improvement. Another possibility is that thanks to these interventions, parents change their view of the child's behavior. Rather than being regarded as simply his/her fault, or due to bad character, it is attributed to underdeveloped executive functions or social cognition capacities. This change in attribution may also change

parents' attitude toward the child. In parent-oriented intervention, the change process capitalizes on the enduring effect of a self-confident or responsive childrearing environment. Self-confident and responsive parents are thought to interact more positively with their child by setting rules, reinforcing good behavior, making autonomy demands or monitoring. Thanks to supportive behavior, they elicit higher enthusiasm, positive affect and compliance in their offspring, which in turn reinforces parents' self-efficacy beliefs and responsiveness. In this case, transactional positive cycles result from parenting improvement. Furthermore, a positive parenting style is associated with the improvement of inhibition capacities in children (Roskam et al. 2014). Accordingly, improvements in parenting may enhance the development of the child's executive functions, leading to better control of his/her behavior. Another possible mediator could be language. Children's language facilitates self-reflection and active control of impulsive responses (Landry and Smith 2010). Accordingly, improving parents' verbal responsiveness improves children's language (Kong and Carta 2013) which in turn may improve children's inhibition capacities and lead to better self-control.

The absence of a program content effect may mean that whether positive transactional cycles proceed from the child or the parent, a similar effect can be expected on children's behavioral adjustment. In a way, these results illustrate the developmental principle of multifinality (Cicchetti and Rogosch 1996) by showing that there may be several ways out of EB, just as there are many pathways into it. They provide insight into which processes are likely candidates for reducing child behavior.

The current results also show that effect sizes are large and comparable (or even higher than) with those reported for previous long and broad child-oriented or parent-oriented intervention programs. First, the length of intervention (8 weeks) seems to be sufficient to achieve a large EB reduction. This had already been shown for an intervention program relating to attachment (Bakermans-Kranenburg et al. 2003), and the recent meta-analysis of Mouton et al. (revised) also indicated that the duration of the program did not moderate its effectiveness. Second, it seems to be unnecessary to deliver multimodal interventions that stimulate numerous child or parenting variables together. The effectiveness of focused intervention may be due to widespread effects that have already been documented for parenting programs (Roskam et al. 2016). Since most parenting concepts are interrelated, intervening on a targeted parenting variable causes widespread change that affects other parenting covariates too. The current results suggest that similar widespread effects could be found for child-focused intervention. In sum, a brief, focused intervention appears to be a reasonable recommendation for practitioners that will improve the cost-effectiveness of treatment for children and their families.

In-depth consideration of the effect sizes suggests that intervening on parental self-efficacy beliefs seems to be slightly more effective than other focuses in the longer run, as this intervention was the only one with a significant effect size between post-test and follow-up. This suggests that enhancing parents' self-confidence is a powerful empowerment strategy, leading parents to generalize positive interactional cycles in various settings and even to initiate new ones long after the end of the intervention.

Finally, as we explored the extent to which child gender, age, IQ, CHAOS, temperament, and EB at baseline were related to EB change, we found significant relations for child emotionality and baseline EB. Interventions were seen to be more effective on average for children with a higher level of EB at baseline and for those with low emotionality. These results are consistent with previous research reporting greater program effectiveness in clinical samples in which children had a high level of EB parents of such children are more motivated to change (Leijten et al. 2015). The higher rate of change may also be because there is more room for improvement in children with higher baseline EB. With regard to temperament, more in-depth analyses need to be performed in order to determine the profile of children for whom each of the four interventions is the most effective. Analysis of participants' differential susceptibility was limited by the number of subjects in each of the four intervention groups.

Limitations

While interesting and promising, the current study is by no means definitive. As a first limitation, this study is based only on parent-reported EB over time. Whereas this is a usual procedure in child development research, reports from teachers or observational assessments would be interesting, and a multi-informant assessment procedure would be the best practice. Second, the CBCL was used as it is widely employed to measure children's behavioral issues. However, it provides a global assessment of EB. Only attention problems and aggressiveness can be distinguished in the preschool form. Previous research has shown that it could be interesting to test the effectiveness of focused intervention programs specifically on EB by separating motor activity, aggressive behavior, non-compliance and irritability for example (Roskam et al. 2015). Third, because of their socio-economic background, the representativeness of the participants was open to question. Although systematic comparisons like that in the current study have not been performed, the effectiveness of the two parent-oriented interventions under consideration here have been tested among at-risk families by the authors in previous

publications (Brassart and Schelstraete 2015a; Roskam et al. 2015). Fourth, since the comparability between the participants in child-oriented vs. parent-oriented interventions was not perfect, with slight differences in child gender, fathers' educational level and internalizing behavior at baseline, it cannot completely be ruled out that these differences influenced the results. Fifth, we chose a pre-post waiting list control group design mostly for ethical reasons. This prevented comparisons at follow-up. Also, the possibility cannot be excluded that the results would have been different if control participants had received treatment as usual or group activities rather than being passive. Sixth, participants in the current study have been allocated to the waiting list based on order of recruitment. This procedure is not a conventional randomization procedure like rolling a dice but it has been chosen for time constraints. Control participants started the waiting-time at the same moment, they could be randomly allocated to the four interventions which could also start at the same moment. It cannot completely be ruled out that the first group of parents were the more motivated if they were easier to recruit or were able to come to the lab sooner. Therefore, the allocation could potentially have led to unmeasured differences. However, it should be noted that adds in newspapers or on Facebook or calls at the radio were delivered at different moments so that the first parents to contact us could just be those who heard the first add whereas parents who came later could be as motivated but just receive the information later on. Seventh, longer follow-up than 16 weeks would be useful in order to appraise long-term effectiveness. Whereas a 4-month period can be considered as a meaningful time for young children, it has to be recognized that the follow-up assessment was related to funding constraints. And the temporal limitation of the research funding remains a central concern for most of researchers in developmental psychology and psychopathology. Finally, slight decreases in both EB and internalizing behavior were reported among children in the waiting list group. This could be due to a placebo effect, due to the sense of support parents felt from the research team when they registered for the study. This effect may also be due to spontaneous behavioral improvement due to increasing maturity. One final limitation is that this study related to group programs only. Future attempts should be made to test the effectiveness of child-oriented and parent-oriented individual interventions.

In sum, the current rigorous comparison between four child-oriented or parent-oriented group focused interventions showed that they are all effective in reducing EB among preschoolers. Their effectiveness was moderated neither by their orientation toward the child or the parent nor by their content, suggesting that several effective solutions exist to improve behavioral adaptation in preschoolers. As a clinical implication, practitioners can adapt their intervention to the willingness of the child or the parent to get involved in a treatment. A second important highlight of this study is that in view of comparable effect sizes, brief focused interventions appear to be a reasonable alternative to long multimodal programs, offering more cost-effective treatment for children and their families. Note that for the purposes of the study, children were randomly attributed to one of the four intervention-focused conditions. However, in a clinical setting, the child's situation could be assessed, i.e., his/her abilities in executive functions, in social cognition, the parents' ability to adapt to the child's language abilities and the parents' beliefs in self-efficacy in order to determine which of these factors needs to be supported by a specific intervention. It has been shown that EB is associated with different risk factors, but that none of these risk factors is present in every child with EB (Roskam et al. 2013). Interventions that target the specific weakness of the child or his/her environment may be even more effective.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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