Numerous types of intervention aim at reducing preschoolers’ externalizing behaviors, including motor overactivity, non compliance, irritability, aggressiveness and inattention (Bongers, Koot, van der Ende, & Verhulst, 2004; Bornstein, Hahn, & Haynes, 2010; Hudziak, Copeland, Stanger, & Wadsworth, 2004). A large proportion of these interventions are oriented towards the parents rather than working directly with the target child. The rationale for working with parents is based on models such as the Social Learning Theory, in which EB is related to problematic parenting (Dishion, French, & Patterson, 1995; Patterson, 1982, 2002; Patterson, DeBaryshe, & Ramsey, 1989; Snyder, Reid, & Patterson, 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 and overreactive 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, leading to lower levels of satisfaction or self-efficacy beliefs as well as to more negative parenting (Coleman & Karraker, 2003).

This parenting model has received considerable empirical support. First, longitudinal associations between parenting variables and children’s behavioral outcomes have been demonstrated. Second, studies have shown the effects of parenting interventions on children’s behavioral outcomes. Many of these come from an evidence-based framework (Briesmeister & Schaefet, 2007). They consistently demonstrate that working on parenting variables is beneficial in lowering the level of EB in children (Bodenmann, Cina, Ledermann, & Sanders, 2008; Gordon & Kogan, 1975; Kaminski, Vallee, Filene, & Boyle, 2008; Scott et al., 2012; Turner, Sanders, & Lutzker, 2006). They show that parenting can be a powerful way to reduce child’s EB, not because it causes it but primarily because parents are in the best position to induce and maintain a positive change for their child.

These studies support the validity of models considering parenting intervention as an appropriate treatment of children’s behavioral problems. However they are unable to inform us about the parenting variables that specifically impact on EB. In the programs based on such studies, several parenting variables are usually manipulated together. 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 and sometimes even contextual aspects of parenting such as marital or sibling relationships, coparenting, and social support.
For example, in the Triple-P, i.e. Positive Parenting Program, several core parenting skills are stimulated, such as giving praise or showing attention to the child (behavioral aspects of parenting), managing parenting stress (cognitive aspects of parenting), or supporting each other in the mother–father relationship (contextual aspects of parenting) (Bodenmann et al., 2008; Sanders & Markie-Dadds, 1996). With our present knowledge, it remains almost impossible to identify exactly what the parent programs stimulated in participants as well as to disentangle the specific effect of each of these parenting variables on behavioral issues in children. This is the problem with multimodal interventions, which prevent us from determining which components are responsible for change (Eisenberg, Champion, & Ma, 2004). The main goal of the current study is therefore to determine which parenting variable causes which effect in reducing EB. It is not only relevant for research but also from a clinical perspective, as it may provide useful information for selecting the most effective parenting variables to be manipulated in programs in order to improve their cost-benefit ratio.

Achieving such goal requires new research methods. Micro-trials provide a good opportunity to attain them (Leijten et al., 2015). They are defined as “randomized experiments testing the effect of environmental manipulations designed to suppress specific risk mechanisms or enhance specific protective mechanisms, but not to bring about full treatment or prevention effects in distal outcomes” (Howe, Beach, & Brody, 2010). Such a focused manipulation offers the opportunity to isolate a variable and disentangle its impact from that of covariates. In this way, they help distinguish between the less and more efficacious elements of parenting interventions, ascertain for whom and in what conditions these elements are the most efficacious and explore the potentialities of tailoring interventions to families’ needs (Leijten et al., 2015).

Few micro-trials are described in the parenting literature. However, several recent examples provide evidence of the relevance of this quasi-experimental method. For example, the improvement of mothers’ self-efficacy through the false feedback technique in laboratory sessions was found to have an immediate effect not only on parenting behavior but also on children’s behavior (Mouton & Roskam, 2014). These findings are the first to convincingly point to a causal effect of the manipulation of the mothers’ self-efficacy beliefs on children’s behavioral outcomes. A complementary micro-trial compared the effect of positive versus negative feedback on parents (Casse, Oosterman, & Schuengel, 2015) using a cry interpretation task. Results showed that positive persuasion led to higher parenting self-efficacy than negative persuasion, but could undermine its long-term resilience. In another piece of recent research, increasing parents’ verbal responsiveness in a one-session intervention was found to lead to better balance in parent/child turn-taking (Brassart & Schelstraete, 2015). Along the same lines, the current study is based on a comparison between two micro-trials in which parenting variables which had previously been related to children’s EB were manipulated. In the first micro-trial, parents’ self-efficacy beliefs were stimulated; in the second, parents’ verbal responsiveness was enhanced.

For the first micro-trial, parents’ self-efficacy beliefs were defined as parents’ self-perceived competence in their role covering the beliefs, thoughts, values and expectations which are activated when one is in charge of a child’s upbringing (Coleman & Karraker, 2002). This concept plays a very central role in parenting, since both indirect and direct relationships have been documented between self-efficacy beliefs and child behavior. With regard to their indirect effect, parental beliefs are mainly thought to encourage the use of specific parenting behaviors. Strong associations have been identified between high self-efficacy beliefs and high parental support or low negative control (Jones & Prinz, 2005; Leerkes & Crockenberg, 2002; Meunier, Roskam, & Browne, 2011). Research has suggested that the possession of a sense of personal competence can be a critical buffer against adversity, enabling parents to cope effectively even with ‘hard to manage’ children (Meunier et al., 2011; Mouton & Roskam, 2014; Sofronoff & Farbrotok, 2002). Parenting behaviors have therefore been seen to mediate the influence of self-efficacy beliefs on children’s behavioral adaptation. High levels of positive beliefs have been found to predict supportive behaviors in parents, 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, Flor, & Gibson, 1999; Shumow & Lomax, 2002; Zimmer-Gembeck & Thomas, 2010). In addition to such indirect influence, parental self-efficacy has been directly related to better adjustment in children of all ages (Ardelt & Eccles, 2001; Coleman, 2003; Jones & 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 & Prinz, 2005; Junttila, Vauras, & Laakkonen, 2007; Mouton & Tum-Te-Wes, 1998; Deloof & Richardson, 2006). Parents who are likely to be more secure when interacting with their child, so that they enjoy the interaction more, are reaffirmed in their relationship and seek to spend frequent quality time together.

For the second micro-trial, the literature has shown that a higher level of EB is frequently associated with poor communicative skills (Gallagher, 1999; Monopoli & Kingston, 2012; Van Schendel, Schelstraete, & Roskam, 2013). First, poor communicative 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, Hancock, Cai, Foster, & Hester, 2000). Second, behavioral difficulties can contribute to language problems, since children displaying such problems may be socially isolated and lack opportunities to practice their communicative abilities. Moreover, parents’ verbal responsiveness has been shown to predict early language learning (Hart & Risley, 1995; Pungello, Iruka, Dotterer, Mills-Koonce, & Reznick, 2009; Vernon-Feagans & 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, Bornstein, & Baumwell, 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, Kaiser, & Delaney, 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 engagement, and frequency of play (Kong & Carta, 2013; Roberts & Kaiser, 2011). For example, Kim and Mahoney (2004; Mahoney, Kim, & Richardson, 2006) found that mothers’ responsiveness was associated with children’s active engagement in a task. In addition, recent studies suggest that verbal responsiveness facilitates children’s emotional behavior (including positive and negative affect) and cognitive outcomes (Landry, Smith, & Swank,
The comparison of these two micro-trials allows a distinction to be made between the specific effect on children's EB of a cognitive aspect of parenting on the one hand, i.e. self-efficacy beliefs, and a behavioral aspect on the other hand, i.e. verbal responsiveness. Moreover, the use in this study of a multi-method procedure of EB assessment including rating of motor activity, attention problems, aggressive behavior, non compliance and irritability also enables us to determine which specific behavior is reduced by either self-efficacy beliefs or verbal responsiveness improvement. In the absence of comparable previous work, this research question remains exploratory.

1. Method

1.1. Participants

Data were collected from 45 children and their parents. The average age of the children (58% girls) was 58.40 months (SD = 7.43). The average age of the parents (81% mothers) was 37.36 years (SD = 5.65). Eighty-three percent of the children and their parents were Belgian and native French-speakers, 12% came from other European countries and the remaining 5% were native to Africa. For 17%, French was not the mother tongue. However, all of the children attended schools in the French-speaking part of Belgium. Five percent were in the first grade of kindergarten, 56% in the second and 39% in the third. A brief evaluation of IQ was carried out using two subtests of the WPPSI-III (Wechsler, 2004): the block design subtest (for reasoning IQ) and the information subtest (for verbal IQ). These subtests have been found to correlate highly with the full-scale IQ (Anastasi & Urbina, 1997). Children with intellectual disabilities were excluded from the study. The average IQ standardized note of the children was 10.52 (SD = 2.34). Twenty percent of the children had previously been in contact with clinicians for behavioral concerns, and 32% for concerns related to language development.

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 6 years (5% of the mothers and 0% of the fathers); others had completed 12 years, corresponding to undergraduate studies in Belgium. Five percent were in the first grade of kindergarten, 56% in the second and 39% in the third. A brief evaluation of IQ was carried out using two subtests of the WPPSI-III (Wechsler, 2004): the block design subtest (for reasoning IQ) and the information subtest (for verbal IQ). These subtests have been found to correlate highly with the full-scale IQ (Anastasi & Urbina, 1997). Children with intellectual disabilities were excluded from the study. The average IQ standardized note of the children was 10.52 (SD = 2.34). Twenty percent of the children had previously been in contact with clinicians for behavioral concerns, and 32% for concerns related to language development.

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SEBs 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, SEBs 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 intervention was as follows: Which 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).

The intervention focusing on enhancing verbal responsiveness was conducted by a certified speech-language pathologist with an extensively trained Master’s student. This parent-implemented language intervention was based on the social interactionist perspective, according to which language is learned in the context of social interactions. To support child language development, the caregiver has to use utterances that reflect the child’s focus of attention and has to adapt his/her language to the child’s stage of development. This framework supports language learning by assisting the child in mapping his/her knowledge and social intention with spoken language (Bruner, 1975; Yoder & Warren, 1993). The content of the intervention 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).

For the two interventions, 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 as well as 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, i.e. parents’ self-efficacy beliefs or verbal responsiveness.

1.3. Measures

Parents’ self-efficacy beliefs were assessed with the Global Parental Self-Efficacy Scale of Meunier and Roskam (EGSCP, 2009). Based on Bandura’s Social Learning Theory (1977) and on subsequent parenting research (Coleman & Karraker, 1998), this is a 25-item scale related to five domain-specific SEB factors: discipline, nurturance, playing, instrumental care, and teaching. It provides five-point scales ranging from “not true at all for me” to “very true for me”. Bandura (1977) suggests that the most valid approach for determining domain-level SEBs relating to a multidimensional construct—such as parenting—is achieved by combining several behaviorally specific assessments. In that sense, self-efficacy beliefs in parenting can be evaluated as a quantitative construct by asking parents about their beliefs in specific parenting activities, such as teaching, playing, providing instrumental care, nurturing or disciplining their child. Items are in the form of affirmatives, for example: “I am able to sense when my child is starting to become distressed” for the nurturance subscale. The measure has been validated on 705 French-speaking parents and displays good psychometric properties, according to Meunier and Roskam (five-factor solution explaining 53.1% of the variance, α ranging from .60 to .84, 2009).

1.4. Parents’ verbal responsiveness

All language samples collected during the free play sessions were manually transcribed with CHILDES (MacWhinney, 2000) by an extensively trained Master’s student. An utterance was defined as a unit of speech indicated by intonation and/or pauses. Multiple utterances per turn were possible. A turn was defined as one or more communicative acts emitted by one participant that was not separated by a communicative act of the other partner or by a pause of more than one second (Girolametto, 1988). Several language measures were generated automatically by the CHILDES computerized profiling system. The expected effect of the responsive intervention was an increase of parental verbal responsiveness. To verify this, firstly, we chose to analyze the parent’s conversational participation, because verbal responsiveness must include balanced turn-taking in order for parent and child to be equal conversational partners. The turn-taking measure was the parent’s Mean Length of Turns (MLT) (in words) calculated as: number of utterances/number of turns for parent. We expected a decrease in this variable after the intervention, because parents would reduce
their conversational participation to assist the child’s verbal participation. Secondly, we chose to analyze verbal responsiveness on the basis of the number of the parent’s utterances that matched the child production. This variable, calculated by the CHILDES computerized system, included three scores: (1) the number of the parent’s responses that exactly matched the child’s utterances, (2) the number of the parent’s responses that matched and expanded the child’s utterances, (3) the number of the parent’s responses that match and reduce the child’s utterances. We expected an increase in this matching score after the intervention, because parent would be more responsive to their child’s utterances.

1.5. Externalizing behaviors

For the multi-informant, multi-method procedure of assessment of EB, several EB-related scales were selected from a questionnaire, an observation and a physiological measurement. Children’s attention problems and aggressive behavior were evaluated with the two first-order EB-related scales, i.e. the “attention problems” and “aggressive behavior” scales, of the preschool version of the Child Behavior Checklist or CBCL (Achenbach, Edelbrock, & Howell, 1987; Achenbach & Rescorla, 2000). The CBCL provided two Likert-type scales: “rare at all present”, “moderately present”, “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 a of .89 for “attention problems” and of .96 for “aggressive behavior”, and r = .58 and .62 for test-retest reliability (Achenbach & Rescorla, 2000). For the French version, the psychometric properties obtained by the authors of the current paper from an independent sample of 186 preschoolers were good and comparable with those obtained in the original American version of the scale, with an a of .79 for “attention problems” and of .93 for “aggressive behavior”, and r = .50 and .56 for test-retest reliability computed in a sub-sample of participants (15%). According to the norms of the second-order EB scale, 61.7% of the children in our sample were in the normal range of EB, 16.6% were in the borderline clinical range, and 21.7% were in the clinical range. Children’s irritability and non-compliance were observed using two EB-related scales of the Crowell Mother–Child Interaction Task (MCIT) procedure (Crowell, Feldman, & Ginsberg, 1988), i.e. irritability (fighting, withdrawn behavior with anger, sulking) and non-compliance (not listening to the mother’s suggestions or requests), which were coded on a seven-point Likert-type scale. The original task involves a series of five episodes, i.e. free play, a frustration task and three increasingly difficult problem-solving tasks (puzzles), designed to elicit behaviors showing how comfortable and familiar the dyad members are with each other, how they negotiate transitions, their ability to change in EB obtained in the two intervention groups. First, we verified that no change in EB occurred in the waiting list group between baseline and the 8-week measurement. To do this, we conducted separate repeated-measures analyses of variances (ANOVAs), with time (baseline vs. 8 weeks later) as the two-level within-subjects factors and the five self-efficacy variables, i.e. discipline, play, affection, nurturing and teaching, and the two verbal responsiveness variables, i.e. MLT and matching, as the dependent variables. Secondly, change in parenting variables in the two intervention groups was tested with repeated-measures ANOVAs, with time (baseline vs. 8 weeks later vs. follow-up) as the three-level within-subjects and group (self-efficacy vs. verbal responsiveness) as the two-level between-subjects, and the parenting variables as the dependent variables. Significant main effects of time were expected, suggesting improvement of parents’ self-efficacy beliefs and verbal responsiveness through intervention. Time × group interaction effects were also expected, indicating higher improvement of self-efficacy beliefs in the self-efficacy intervention than in the verbal responsiveness intervention, and conversely higher improvement of verbal responsiveness in the verbal responsiveness intervention than in the self-efficacy intervention.

The main statistical analysis consisted of the comparison of change in EB obtained in the two intervention groups. First, we verified that no change in EB occurred in the waiting list group between baseline and the 8-week measurement. Separate repeated-measures analyses of variances (ANOVAs) were computed, with time (baseline vs. 8 weeks later) as the two-level within-subjects factors and the five EB variables, i.e. CBCL attention problems, CBCL aggressive behavior, 3AAP Motor activity, MCIT irritability, and MCIT non compliance, as the dependent variables. Second, the comparison of change in EB obtained in the two intervention groups was performed with repeated-measures ANOVAs, with time (baseline vs. 8 weeks later vs. follow-up) as the three-level within-subjects and group (self-efficacy vs. verbal responsiveness) as the two-level between-subjects, and the EB variables as the dependent variables. Significant main effects of time were expected, suggesting improvement of children’s behavior. Significant time × group interactions were also expected to reveal which specific behavior was reduced by improvements in
either self-efficacy beliefs or verbal responsiveness.

2. Results

2.1. Preliminary analyses: comparability between groups

With regard to socio-demographic data, mothers' educational level and parents' age were higher in the waiting list group. No other significant difference was found between groups. Socio-demographic information and statistical comparisons are reported in Table 1. For the two groups' baseline level of self-efficacy beliefs and verbal responsiveness, the comparisons support the comparability between the participants randomly assigned to the two conditions. Information is given in Table 2. Finally, the two groups' baseline of EB was compared. Descriptive data are displayed in Table 3 with statistical comparisons. As shown, baseline levels were not significantly different between the two groups for EB variables.

With regard to the associations between EB variables as shown in Table 4, coefficients ranged from .21 to .65, indicating that the behaviors under consideration were partly independent from each other in our sample. The results suggest that the preschoolers participating in this study displayed different patterns of EB problems. It is therefore interesting to identify which specific behaviors benefited from improvements in self-efficacy beliefs or verbal responsiveness.

Descriptive data and statistical comparisons between baseline, 8-week and follow-up measurements of the parenting variables are presented in Table 5. With regard to change in parenting variables in the waiting list group, a significant main effect of time was found for self-efficacy in discipline, F(1,23) = 16.01, p < .001, in nurturing, F(1,23) = 3.20, p < .10, and in teaching, F(1,23) = 14.76, p < .001, which were seen to decrease in the absence of intervention. With regard to the effectiveness of the two interventions, a main effect of time was found to be significant for the discipline domain of self-efficacy beliefs, F(2,68) = 10.55, p < .001, the affective domain, F(2,68) = 6.36, p < .01, the nurturing domain, F(2,68) = 4.50, p < .05, and the teaching domain, F(2,68) = 4.30, p < .05 meaning that there was improvement in these domains in the two groups. The same was also true for MLT, F(2,68) = 2.99, p < .05, which decreased as expected, and matching, F(2,68) = 2.45, p < .10, which tended to improve. Two time × group interactions were found to be significant for self-efficacy in the discipline, F(2,68) = 4.94, p < .05, and teaching, F(2,68) = 7.59, p < .001, domains. Interactions are presented in Figs. 2 and 3. As expected, they show that improvement in self-efficacy beliefs in discipline and teaching was higher in the self-efficacy intervention group than in the verbal responsiveness intervention group. Taken together, these results confirmed that the two interventions were effective in changing the target parenting variables in the expected direction. Nevertheless, only two of seven interactions were found to be significant, suggesting unexpected effects of interventions on non-targeted parenting variables.

2.2. Micro-trial comparisons

Descriptive data and statistical comparisons between baseline, 8-week and follow-up measurements of EB variables are presented in Table 6. With regard to change in EB variables in the waiting list group, a significant main effect of time was found for motor activity, F(1,23) = 25.52, p < .001, which increased in the absence of

Table 1
Descriptive statistics for socio-demographic data and comparisons between the two groups.

<table>
<thead>
<tr>
<th></th>
<th>Waiting list N = 24</th>
<th>Verbal responsiveness N = 16</th>
<th>t(38)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children's age</td>
<td>M = 59.33, sd = 5.49</td>
<td>M = 56.06, sd = 11.21</td>
<td>1.22</td>
</tr>
<tr>
<td>Parents' age</td>
<td>M = 38.35, sd = 4.96</td>
<td>M = 33.63, sd = 6.02</td>
<td>2.58*</td>
</tr>
<tr>
<td>Children's IQ</td>
<td>M = 10.64, sd = 2.36</td>
<td>M = 9.90, sd = 2.53</td>
<td>.83</td>
</tr>
<tr>
<td>Mothers' educational level</td>
<td>M = 5.67, sd = 1.78</td>
<td>M = 4.63, sd = 1.5</td>
<td>1.92</td>
</tr>
<tr>
<td>Fathers' educational level</td>
<td>M = 5.23, sd = 1.87</td>
<td>M = 5.21, sd = 1.72</td>
<td>.02</td>
</tr>
<tr>
<td>Income</td>
<td>M = 2.45, sd = 1.31</td>
<td>M = 1.87, sd = 1.08</td>
<td>1.46</td>
</tr>
<tr>
<td>Waiting list N = 24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous counseling</td>
<td>M = 5/19</td>
<td>M = 6/10</td>
<td>2.00</td>
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<tr>
<td>Language concerns</td>
<td>M = 7/17</td>
<td>M = 7/9</td>
<td>1.32</td>
</tr>
<tr>
<td>Gender (girls/boys)</td>
<td>M = 14/10</td>
<td>M = 8/8</td>
<td>.26</td>
</tr>
<tr>
<td>Parent participating (mothers/father)</td>
<td>M = 18/6</td>
<td>M = 15/1</td>
<td>2.33</td>
</tr>
</tbody>
</table>

*p < .10; *p < .05.
intervention. For the comparison between the two micro-trials, a main effect of time was identified for aggressive behavior, $F(2,68) = 9.93, p < .001$, as well as for non compliance, $F(2,68) = 2.49, p < .10$, meaning that aggressiveness and non compliance decreased on average through the two interventions. A significant time × group effect was also found for irritability, $F(2,68) = 2.95, p < .05$. This is presented in Fig. 4. It suggested that irritability decreased in the self-efficacy but not in the verbal responsiveness intervention group. Taken together, these results show that the interventions' effects were specific to some behaviors and that intervention on self-efficacy beliefs was slightly more effective than intervention on verbal responsiveness in reducing EB.

### 3. Discussion

The main goal of the current study was to identify which parenting variables caused reductions in children's EB. This was achieved by comparing two micro-trials in which two parenting variables previously associated with EB were manipulated. The effect of the manipulation, consisting of improving either parents' self-efficacy beliefs or their verbal responsiveness, was estimated for five relevant behaviors, i.e. attention problems, aggressiveness, motor activity, irritability and non-compliance, using a multi method assessment strategy. The research highlights that the two parenting variables under consideration here caused a significant decrease in children's EB. However, this was limited to three of the five behaviors for the self-efficacy condition, i.e. aggressiveness,

### Table 4

Correlations between EB measures.

<table>
<thead>
<tr>
<th></th>
<th>CBCL Aggressive behavior</th>
<th>3 AAP Motor activity</th>
<th>MCIT irritability</th>
<th>MCIT non compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBCL Attention problems</td>
<td>.65***</td>
<td>.26</td>
<td>.21</td>
<td>.35**</td>
</tr>
<tr>
<td>CBCL Aggressive behavior</td>
<td>.21</td>
<td>.30*</td>
<td>.21</td>
<td></td>
</tr>
<tr>
<td>3AAP Motor activity</td>
<td></td>
<td></td>
<td>.45***</td>
<td></td>
</tr>
<tr>
<td>MCIT Irritability</td>
<td></td>
<td></td>
<td>.44***</td>
<td></td>
</tr>
</tbody>
</table>

$p < .10; *p < .05; **p < .01; ***p < .001.$

### Table 5

Means (M) and standard deviations (sd) of parents' self-efficacy beliefs and verbal responsiveness for the baseline, 8-week and follow-up measurements according to assignment in the waiting list, self-efficacy or verbal responsiveness intervention, and ANOVAs results.

<table>
<thead>
<tr>
<th></th>
<th>Waiting list</th>
<th>Self-efficacy intervention</th>
<th>Verbal responsiveness intervention</th>
<th>Time effect</th>
<th>Time × group effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline M (sd)</td>
<td>8 weeks later M (sd)</td>
<td>Baseline M (sd)</td>
<td>8 weeks later M (sd)</td>
<td>Follow-up M (sd)</td>
</tr>
<tr>
<td>Self-efficacy beliefs</td>
<td>Discipline 3.15 (.77)</td>
<td>2.68 (.79)</td>
<td>2.73 (.83)</td>
<td>3.35 (.71)</td>
<td>3.56 (.75)</td>
</tr>
<tr>
<td></td>
<td>Play 3.35 (.91)</td>
<td>3.36 (.90)</td>
<td>3.21 (.92)</td>
<td>3.58 (.94)</td>
<td>3.44 (1.00)</td>
</tr>
<tr>
<td></td>
<td>Affection 4.17 (.63)</td>
<td>4.43 (1.61)</td>
<td>4.33 (.67)</td>
<td>4.38 (.36)</td>
<td>4.48 (.40)</td>
</tr>
<tr>
<td></td>
<td>Nurturing 3.74 (1.20)</td>
<td>3.52 (2.13)</td>
<td>4.36 (1.14)</td>
<td>4.06 (.76)</td>
<td>4.13 (.64)</td>
</tr>
<tr>
<td></td>
<td>Teaching 3.49 (.77)</td>
<td>3.30 (.73)</td>
<td>3.28 (.80)</td>
<td>4.25 (.76)</td>
<td>4.00 (1.07)</td>
</tr>
<tr>
<td>Verbal responsiveness</td>
<td>MLT 9.71 (2.91)</td>
<td>9.11 (3.69)</td>
<td>8.85 (4.11)</td>
<td>7.75 (1.84)</td>
<td>11.31 (5.49)</td>
</tr>
</tbody>
</table>

$p < .10 *p < .05 ***p < .001.$

---

**Fig. 2.** Time × group interaction for self-efficacy beliefs in the discipline domain.

**Fig. 3.** Time × group interaction for self-efficacy beliefs in the teaching domain.
irritability and non-compliance, and to two of the five behaviors for the verbal responsiveness condition, i.e. aggressiveness and non-compliance. It can be suggested from these results that the improvement of self-efficacy beliefs has an effect on children's EB across a slightly wider spectrum than the enhancement of verbal responsiveness. The decrease of children's aggression and non-compliance problems through parental verbal responsiveness stimulation is nevertheless an interesting finding. The main purpose of verbal responsiveness intervention is to lead to better child communication. The current research is one of the first analyses of its impact on children's behavior (Kong & Carta, 2013).

How should these main research findings be interpreted? In particular, why does improving self-efficacy have a greater effect in reducing children's EB than enhancing verbal responsiveness? How are we to understand the fact that stimulating a cognitive aspect of parenting, i.e. self-efficacy beliefs, has a greater effect than stimulating a behavioral aspect of parenting, i.e. verbal responsiveness? First, it has been found in the current study that the parenting variables, both self-efficacy beliefs and verbal responsiveness, improved over time irrespective of the intervention component. However, the two interaction effects indicated that improvement in self-efficacy beliefs in the discipline and teaching domains was higher through self-efficacy than verbal responsiveness stimulation. This suggests that self-efficacy intervention was slightly more effective in stimulating positive parenting, which could in turn result in better outcomes for children. Second, several studies have demonstrated that the stimulation of verbal responsiveness in parents leads to more positive behavior in their children, in particular positive affect and task engagement (Kim & Mahoney, 2004; Kong & Carta, 2013; Landry et al., 2006). However, such positive variables were not under consideration in the current study, which prevented us from identifying additional benefits of verbal responsiveness stimulation. Third, it is possible that achieving a reduction in children's EB through better practices by parents depends on a previous step consisting of cognitive reassurance. It is known that EB is associated with low self-efficacy beliefs in parents. Faced with defeats and frustrations in child-rearing, mothers and fathers tend to feel discouraged and to disengage from parent–child interactions. Such a process makes it difficult to create a therapeutic alliance with discouraged parents, who tend instead to wait for an effective solution from clinicians. Helping to boost their confidence in their role as parents could
therefore be a preliminary step before trying to achieve behavioral change in childrearing. If this is true, brief interventions should preferably be focused on improving self-efficacy beliefs rather than on behavioral aspects, and longer ones should preferably combine the two parenting aspects, with improving self-efficacy beliefs being considered as a preliminary step. Other micro-trial comparisons are needed to confirm this interpretation of the findings. They should compare the manipulation of self-efficacy with other behavioral aspects of parenting. They should also evaluate the reduction of EB gained from the combined manipulation of self-efficacy beliefs with one parenting behavior, for example verbal responsiveness.

Several unexpected results also emerged from the current study. They can be summarized with two separate questions. First, why was there no decrease in either attention problems or motor activity in either the first or the second micro trial? Second, why did parenting variables including both self-efficacy beliefs (except play) and verbal responsiveness improve over time irrespective of the manipulation components? With regard to the first question, we think that EB is a complex entity whose nature is sometimes oversimplified. For example, the second-order EB-related scale of the CBCL (Achenbach & Rescorla, 2000, 2004) is widely used as a global outcome in child and adolescent psychology research. This can lead to the false idea that hard-to-manage behaviors can be reduced as a whole. Rather, our findings suggest that treatment effects can be limited to specific first-order behaviors. Correlations between these behaviors have also been found to be low to moderate, meaning that children may, for example, display attention problems with or without aggressiveness, or high irritability with or without motor overactivity. We therefore recommend that future research should be attentive to specific reductions of specific externalized behaviors rather than report overall changes in EB scores. From a clinical perspective, this would be useful in helping target those parenting variables that need to be stimulated according to the children’s behavioral pattern. With regard to the first question also, our results suggest that enhancing either self-efficacy beliefs or verbal responsiveness is not an effective way of reducing attention problems or motor activity. These two behaviors may be considered as more typically linked to physiological processes such as a deficit in executive functioning (Diamond, 2013), by contrast with aggressiveness, non compliance or irritability, which more obviously relate to the relational pattern of EB. Thus, the manipulation of parenting variables may have a stronger impact on interaction-related issues than on maturational processes. Again, replication studies are needed to confirm this interpretation. It should also be recognized that in the current design, it remains impossible to disentangle method-from symptom-related effect. In other words, we cannot be sure whether the specific effects obtained for the five EB outcomes are due to the symptom itself or to the method. In our multi-method strategy, a questionnaire completed by the parent, an observation coded by trained researchers, and an accelerometry device were used. It may be that the variations found in the manipulation effects on the different EB outcomes are explained by the characteristics of the method. In particular, the probability of observing a significant change in EB may be higher with parents’ reports or in observations made by coders involved in the research project than with an objective device as the 3-AAP.

With regard to the second question, about why self-efficacy beliefs and verbal responsiveness were improved through intervention irrespective of the manipulation components, it is possible that the second manipulation not only enhanced verbal responsiveness but also parents’ responsiveness in a broader sense. Parents’ responsiveness consists of responding with feeling, in a prompt and sensitive manner, to the child’s signals and behaviors (Bornstein, 1989; Landry et al., 2006; Watson et al., 2014). It is therefore not completely surprising that in the second micro-trial, responsiveness stimulation was associated with better self-efficacy beliefs. On the other side, verbal responsiveness improved through self-efficacy stimulation. It may be that boosting parents’ confidence in their role for 8 weeks led to behavioral change in participants such as encouraging their child to interact in a positive manner and considering him/her as a partner with whom quality time needed to be shared. Taken together, these results suggest that stimulating one parenting variable could have not just a specific positive effect on this target variable, but also a widespread effect on other parenting variables thanks to cascading consequences. It would be useful to test this hypothesis in future investigation. From a clinical perspective, it may help to identify parenting variables with the power to trigger positive cascade effects in mothers’ and fathers’ development. These should preferably be targeted in parenting programs in order to improve their cost-benefit ratio.

While interesting in many ways, this study is by no means definitive. Several limitations have to be recognized and overcome in future studies. First of all, our methodological choice of working with a waiting list prevented us from obtaining follow-up data in the control group. The possibility cannot be completely excluded that significant spontaneous changes occur in parenting variables in the longer term. However, this methodological choice was made for ethical reasons. We wanted all the participants to benefit from intervention. An additional 8-week waiting time would have been too long, leading to dropping out, high levels of frustration among voluntary participants, and supplementary measurement occasions involving questionnaire completion and home observation. In the same way, the MCIT procedure and coding (Crowell et al., 1988) was restricted to the two first tasks in order to limit the assessment procedure. Second, the follow-up physiological measure of motor activity with the 3-AAP device was missing in the second micro-trial for practical and technical reasons. This prevented us from testing whether and to what extent verbal responsiveness improvements caused reductions in motor activity in the long term. The 3-AAP device has also to be considered as a continuous measure of motor activity. In the absence of any benchmark, we remain unable to detect children who are at risk of hyperactivity. It is also possible that none of the children participating displayed hyperactivity. Third, the limited number of participants in each micro-trial limited the statistical analyses that could be computed. In particular, we regret that moderation analyses were not possible, especially with regard to socio-economical risk, child gender, or parent gender. Moderation analyses are of particular value for identifying the participants who benefited the most from the intervention. Finally, it may be considered that the sample participating in the current study was not representative of the population of parents and children who are in need of intervention to address child EB. However, being in the clinical range of EB is not the only criterion that makes intervention relevant. Many parents seek help because they have legitimate concerns about their child’s behavior and want to improve their relationships. Such parents were targeted by the current intervention research. Nevertheless, replication of this study among clinically referred children and their parents would be important.

In sum, the current study shows that self-efficacy would be a good area to work on in parenting programs aiming at reducing children’s aggressiveness, non compliance and irritability, and that improving parents’ verbal responsiveness is another good way of reducing their children’s aggressive and non compliant behavior. This gives support to micro-trials as a relevant method in parenting research for identifying the most relevant aspects to be targeted in interventions. From a clinical viewpoint, the cost-benefit ratio of
interventions can be improved by identifying which among the numerous parenting variables involved in evidence-based programs necessary and sufficient to reduce EB in children.

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