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Video-feedback intervention to promote positive parenting and sensitive discipline in early elementary education (VIPP-School): a randomized controlled trial

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ABSTRACT

The VIPP-SD (Video-feedback Intervention to promote Positive Parenting and Sensitive Discipline) program has been shown to promote positive interactions between parents and children with behavior problems. This study evaluated an adapted version for teachers (VIPP-School) through a parallel-group randomized controlled trial involving 58 teacher–child dyads from kindergarten to second grade. Teacher–child dyads were randomly assigned to VIPP-School ($n = 28$) or an active control group ($n = 30$). Intention-to-treat analyses showed improvements in teacher sensitivity ($d = 0.87$) and supportive teacher classroom interactions ($d = 0.53$) in the VIPP-School condition compared to the control condition. VIPP-School had no significant effect on teachers' observed sensitive discipline (although changes were in the expected direction), nor on reported child externalizing behavior, overall relationship quality, school happiness or teacher self-efficacy. These findings show that the intervention, originally developed for families, could be effectively applied to early elementary education. The limited number of sessions increases the feasibility of VIPP-School.

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KEYWORDS
Behavior problems; randomized controlled trial; sensitive discipline; sensitivity; teacher–child interaction

Introduction

Child behavior problems in classrooms pose significant challenges for teachers, frequently resulting in negative interactions between teachers and children, undermining the development of positive teacher–child relationships (e.g. Hamre & Pianta, 2001; Henricsson & Rydell, 2004; McGrath & Van Bergen, 2015; O'Connor et al., 2011; Spilt & Koomen, 2009). Especially externalizing behaviors can be challenging for teachers, which tend to persist over time without intervention (Bierman & Sasser, 2014; Rudasill et al., 2010). Promoting positive teacher–child relationships can redirect

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negative interaction cycles and support positive child development (Hamre & Pianta, 2001; McGrath & Van Bergen, 2015). In this study, we tested VIPP-School, an adapted version of a parenting intervention with demonstrated effectiveness (Video-feedback Intervention to promote Positive Parenting and Sensitive Discipline, VIPP-SD, Juffer et al., 2008; Van IJzendoorn et al., 2023) using a randomized controlled trial (RCT) in an early elementary education setting, with the aim of supporting positive teacher–child interaction with children with behavior problems.

There has been a growing interest in the role teacher–child relationships play in the development or persistence of child behavior problems. Teacher–child interactions impact children's academic, social, behavioral and emotional development (Hamre & Pianta, 2001; McGrath & Van Bergen, 2015; Roorda et al., 2021; Vandenbroucke et al., 2017). The quality of teacher–child relationships can be operationalized using the dimensions of closeness, conflict and autonomy/dependency (Hamre & Pianta, 2001). Children with externalizing behavior problems are more likely to face negative interactions with teachers (Doumen et al., 2008), while positive teacher–child interactions can buffer the impact of adverse factors on children's development (McGrath & Van Bergen, 2015). For example, positive teacher–child relationships can prevent child behavior problems from worsening (Baker, 2006; McGrath & Van Bergen, 2015).

Research on teacher–child relationships and interactions has been primarily guided by attachment theory and coercion theory. Attachment theory describes the biological predisposition of children to use their caregivers as a haven of safety providing comfort and protection when they are distressed, and as a secure base to explore the environment when they are at ease (Bowlby, 1969). The attachment framework can be extended to include child–teacher relationships, with their daily interactions and shared experiences contributing to the quality of their relationship (Sabol & Pianta, 2012; Verschueren & Koomen, 2012). Teacher–child relationships are established in a transactional developmental process, reflecting the contributions of the child as well as the teacher's ability to create a positive bond through sensitive and responsive interactions. Sensitivity and responsiveness refer in this context to the teacher's ability to accurately perceive child signals and to respond to these signals in an adequate and prompt way (Ainsworth et al., 1974).

Coercion theory, derived from social learning principles, explains how ineffective caregiver discipline can enhance child behavior problems. Through coercive cycles, negative reinforcement processes contribute to the development and persistence of behavior problems in school-aged children (e.g. Patterson, 1982; Prinzie et al., 2003). In coercive cycles, children are reinforced for oppositional or noncompliant behavior (by the caregiver's attention or giving in), which in turn reinforces the child's challenging behavior. Other forms of ineffective caregiver discipline include inconsistent discipline and a lack of positive reinforcement for compliant and prosocial behaviors. In the classroom context, interventions promoting effective classroom management practices (e.g. positive reinforcement, consistent limit-setting and monitoring) have shown promising results in reducing child behavior problems (Oliver et al., 2011; Key2-Teach; Hoogendijk et al., 2018).

Combining attachment theory with coercion theory offers a promising approach to improving teacher–child interactions and child behavior, particularly in preschoolers (e.g. Playing-2-gether, Vancraeyveldt et al., 2015; Teacher–Child Interaction Therapy; McIntosh & Bliss-Leslie, 2000; Teacher–Child Interaction

Training; Lyon et al., 2009). A well-documented parenting intervention that integrates both theories and is effective even with older children (0–9 years) is the Video-feedback Intervention to promote Positive Parenting and Sensitive Discipline (VIPP-SD; Juffer et al., 2008; Van IJzendoorn et al., 2023), which uses video-feedback to support caregivers in enhancing their sensitivity in response to children's initiatives and setting firm and consistent limits to prevent coercive cycles. The effectiveness of VIPP-SD is widely studied in randomized controlled trials that have shown positive effects on parental sensitivity, sensitive discipline, parental attitudes and child attachment security in various samples (Juffer et al., 2017; Van IJzendoorn et al., 2023). In addition, some studies have found a significant reduction in child behavior problems (e.g. Juffer et al., 2017; O'Farrelly et al., 2021). VIPP-SD has been adapted for use in settings outside the family context, such as home-based and center-based childcare, and has been found effective in improving professional child care quality (Groeneveld et al., 2011; Werner et al., 2018). We recently adapted VIPP-SD to the specific needs of teachers in early elementary education (VIPP-School). A qualitative study showed VIPP-School to be feasible and acceptable (Starreveld et al., 2024a).

The present study

We tested the video-feedback intervention program VIPP-School in elementary education using an RCT design with an intervention group and an active control group. The teachers participated with one child they selected for participation based on the difficulties experienced in the interaction with the child, most often related to the child's externalizing behavior. In line with earlier research into the effectiveness of VIPP-SD, we expected the intervention to be effective in enhancing teacher sensitivity and sensitive limit-setting as primary outcomes (Juffer et al., 2017; Van IJzendoorn et al., 2023). As secondary outcomes, we were interested in intervention effects on child externalizing behaviors (O'Farrelly et al., 2021; Van Zeijl et al., 2006) and teachers' and children's perspective of the teacher–child relationship quality. Other secondary outcome measures include child school happiness and teacher self-efficacy, as research has highlighted the association between the quality of the teacher–child interaction and these constructs (Hajovsky et al., 2020; Newland et al., 2019; Tschannen-Moran & Woolfolk Hoy, 2001; Whitley et al., 2012). Lastly, with an exploratory aim, we probed for an intervention effect beyond the teacher–child dyad, based on the observation of teacher–classroom interaction.

Method

This was a multicenter, parallel-group study with balanced randomization (1:1) conducted in the Netherlands.

Participants

Using convenience sampling, teachers were recruited from schools primarily located in the western part of the Netherlands between the spring of 2021 and mid-2023. Teachers were eligible for inclusion if they (1) were employed for at least 2 days in kindergarten, grade 1 or 2 (or 3, provided the cognitive functions of the child were at grade 2 level) in elementary education or special education for children with emotional/behavioral problems and (2) struggled with a specific child's behavior and

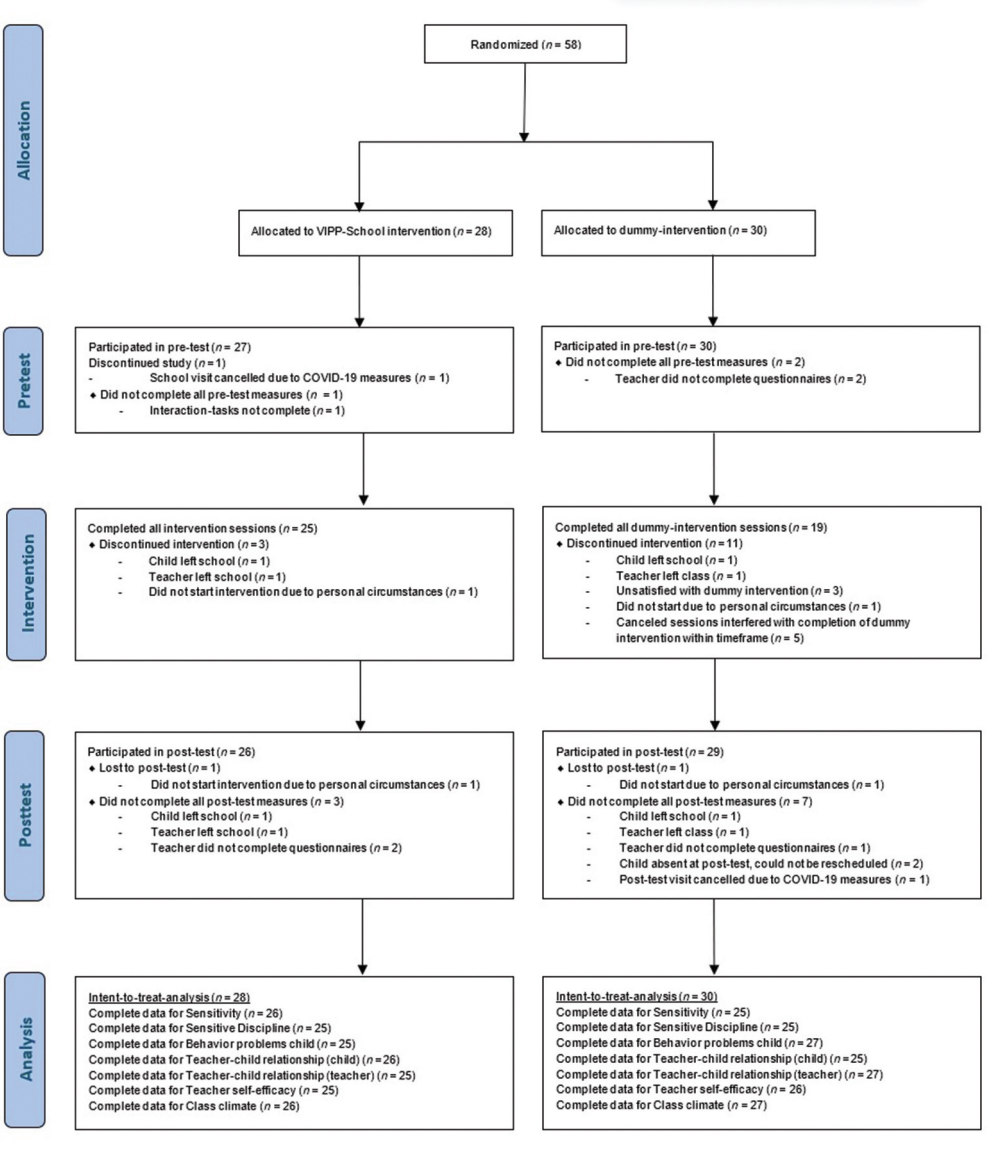

Figure 1. Flowchart of the randomized controlled trial with VIPP-School. Note: Number of participants reflects the number of teacher–child dyads.

Table 1. Pretest characteristics of participants per treatment allocation.

	Intervention group (n = 28)		Control group (n = 30)	
Measure (range)	Pretest M (SD)	Posttest M (SD)	Pretest M (SD)	Posttest M (SD)
Sensitivity (1-7)	3.87 (1.20)	4.65 (1.33)	4.44 (1.43)	4.08 (1.37)
Sensitive Discipline – Supportive Presence (1–7)	3.85 (1.43)	4.21 (1.47)	3.90 (1.52)	3.96 (1.37)
Sensitive Discipline – Laxness (1–5)	2.69 (1.23)	1.97 (1.03)	2.70 (1.30)	2.40 (0.87)
Child externalizing behavior problems (0–2)	0.80 (0.43)	0.69 (0.47)	0.86 (0.34)	0.78 (0.39)
School happiness (0–2)	1.38 (0.44)	1.39 (0.41)	1.56 (0.40)	1.39 (0.43)
Relationship quality – Teacher (1–5)	3.32 (0.55)	3.71 (0.57)	3.27 (0.48)	3.49 (0.49)
Relationship quality – Child (1–2)	1.72 (0.15)	1.75 (0.14)	1.76 (0.17)	1.80 (0.12)
Teacher self-efficacy – Classroom management (1–9)	6.34 (1.24)	6.71 (0.97)	6.24 (1.03)	6.84 (1.12)
Teacher-classroom interaction – Student support (1–7)	4.11 (1.06)	4.43 (0.84)	4.31 (0.94)	4.02 (1.03)

Reported values are based on imputed data.

wanted to improve the relationship with the child. In total, 58 teacher–child dyads provided written informed consent (see Figure 1 for the flowchart of inclusion). Table 1 provides descriptives for the total sample, intervention group and control group. For privacy reasons, instead of reporting participant ethnicity, teachers were asked whether their ethnicity matched that of the child, as mismatched ethnicities could hinder relationships due to cultural misunderstandings (Rasheed et al., 2020; Thijs et al., 2012).

Procedure

The study was approved by the Ethics Committee of the Faculty of Behavioral and Movement Sciences at the Vrije Universiteit Amsterdam (VCWE-2020-167R1). At the start of data-collection, the study's design and hypotheses were registered in the International Standard Randomised Controlled Trial Number (ISRCTN) registry (ISRCTN12710516). The study adheres to the CONSORT guidelines (see Supplement A; Moher et al., 2012). Before participating in the study, teachers and the children's parents received oral and written information about the study and provided written consent.

The research team used a computer-generated list to randomly assign teacher–child dyads, stratified by school, to either the intervention condition ($n = 28$) or the active control condition ($n = 30$) with dyads from the same school balanced across both conditions. Allocation was recorded to prevent interference from the researchers. Teacher–child dyads in the intervention group received six school visits, and, parallel in timing, teachers in the control group received six online video-calls as dummy treatment. The treatment period lasted on average 11 weeks ($SD = 3.98$).

Data were collected at three time points: pretest (T1; before the start of the intervention), posttest (T2; on average 2 weeks after the last treatment visit) and follow-up (T3; on average 7 weeks after T2). Unfortunately, the follow-up wave was rather incomplete, capturing less than half of the sample, due to time constraints near the end of the school year. Consequently, we only use data from the pretest and posttest. At pretest and posttest, teacher–child dyads were visited at school. During these visits, a 3-h live classroom observation was carried out, the teacher and child completed two interaction

tasks and the target child completed two questionnaires with the help of a research assistant. Before the visit, teachers completed several online questionnaires.

Intervention condition: VIPP-School

Four certified VIPP-SD interveners were trained to implement the VIPP-School intervention and participated in regular intervision meetings during the intervention phase. Three of the interveners had a university degree in education and child psychology, the fourth intervener had a bachelor's degree in child studies. Intervention sessions were delivered at the teacher's school.

VIPP-School started with an introductory visit to make the first videotapes, followed by five intervention sessions. The duration of each intervention session was approximately 1.5 hr. The first four intervention sessions were ideally scheduled every 2 weeks; the last session was scheduled a month after the fourth session. Each session started with the intervener videotaping two or three protocolized teacher–child interactions (e.g. reading a book together, making a puzzle). In between school visits, the intervener prepared a "script" with feedback on the video fragments.

Table 2. Themes in the VIPP-School program.

Session	Focus	Theme	Description
1	Sensitivity	Exploration versus attachment behavior	Explaining that children alternate between exploratory behavior (e.g. trying to make something work) and attachment behavior (e.g. seeking eye contact), requiring different teacher responses
	Sensitive discipline	Inductive discipline and distraction	Suggesting giving the reasons behind rules and expectations (inductive discipline) and the use of distraction techniques to redirect child attention when necessary
2	Sensitivity	"Speaking for the child"	Supporting the teacher's recognizing (subtle) child signals by providing "subtitles" to verbal and non-verbal child behavior
	Sensitive discipline	Positive reinforcement	Encouraging adequate child behaviors by providing rewards or praise, strengthening the likelihood that the behavior will be repeated
3	Sensitivity	Sensitivity chain	Focusing on the importance of prompt and adequate responses to child signals. Based on the recordings, the child's reaction when the teacher promptly and adequately responds to a child signal is highlighted. This way, the teacher's attention is drawn to the feedback provided by the child, with the ultimate aim of making the teacher independent of the intervener's feedback
	Sensitive discipline	Sensitive pause	Introducing the use of a sensitive "pause" to help teacher and/or child calm down before addressing difficult behavior. This pause allows both parties to regain composure before reconnecting to discuss the behavior and repair the relationship.
4	Sensitivity	Sharing emotions	Encouraging open communication about feelings, emphasizing the importance of acknowledging and validating both positive and negative emotions. Attention is given to decoding child signals that may be ambiguous or distorted due to the child's experiences in other relationships
	Sensitive discipline	Empathy	Fostering emotional understanding and empathy. It involves recognizing the child's perspective and responding with compassion, and stimulating the child's empathy and compassion for other children.
5	Sensitivity and Sensitive discipline	Booster session	All themes are reviewed, with explicit attention to the transfer of the learned skills to daily classroom practice

Adapted from Manual Video-feedback Intervention to promote Positive Parenting and Sensitive Discipline (VIPP-SD) (version 3.0) (Juffer et al., 2015).

After videotaping, the intervener and teacher discussed the video fragments of the previous session according to the themes of each session (see Table 2 for an overview and description of the themes). During this feedback, positive and successful interaction moments were highlighted, and (from session 3 onwards) alternatives for insensitive interactions were discussed with the teachers.

Dyadic interactions were filmed outside of the classroom so the teacher could practice with newly acquired behavior without the distraction of the classroom, except for the last session. The video to be reviewed during the fifth session was filmed in the classroom to promote the transfer of skills to the classroom setting. This session was aimed at consolidating intervention effects by integrating tips and feedback from the previous sessions. At the end of the intervention, teachers received a brochure with information on the key issues discussed during the sessions.

VIPP-School, as an adaptation of the VIPP-SD program, is both standardized (interveners use a detailed manual describing the structure, themes, tips and exercises for teacher and child for each school visit) and individualized (feedback is based on the videotaped interaction of the specific teacher–child dyad). Adaptations to VIPP-SD to address challenges faced by teachers are described elsewhere (Starreveld et al., 2024b) and mainly include the adaptation of materials and activities to suit the school context rather than the family context and leaving out the second booster session with an eye to teachers' busy schedules and their and their increased knowledge of development through training and education.

For each intervention-dyad, two randomly chosen intervention sessions were coded on treatment fidelity. The intervener's feedback script for the session was coded for intervention adherence using an adapted version of the 5-point rating scale used in O'Farrelly et al. (2021). Approximately 10% of the feedback scripts were double coded (ICC, single measure, absolute agreement, 0.71). A cut-off score of 3 was used when the essential feedback components for that specific session were present. The adherence scores for both sessions were averaged to calculate a fidelity score representing the trajectory of the dyad. Treatment fidelity was high: 100% of the trajectories met the minimum fidelity threshold, showing that in all cases the intervention was delivered as intended. The mean (*SD*) score for fidelity was 4.52 (0.32). Program attendance was high: 93% of the teachers that started the intervention received all six visits (the baseline visit and five intervention sessions; $M = 5.74$, $SD = 0.94$).

Active control condition

Parallel to the intervention sessions, teachers in the control group received six online video-calls. This dummy-intervention was implemented to ensure comparable motivation and attention in the intervention and control groups and to prevent selective attrition. Eight trained female masters'-students discussed child-related topics with teachers following a semi-structured interview format (e.g. the child's mood, language development, motor skills and learning progress). Control group teachers received no advice or feedback on their interaction or relationship quality with the child. In case of requests for advice or information, teachers were invited to give their perspective on the behavior of the child and were suggested to consult the special needs team in their school. Program attendance was lower than in the intervention group, though not significantly lower (*t*

(49.81) = −1.87, $p = .07$), with 63% of the participants receiving all scheduled calls (M = 5.13, SD = 1.48).

Measures

Primary outcome measures

Observed teacher sensitivity. Dyadic teacher sensitivity was observed using a computerized version of the Etch-A-Sketch task as previously used in, e.g. Euser et al. (2021) and Vrijhof et al. (2020). The teacher–child dyad was instructed to recreate three printed example drawings on a computer using four buttons. Both teacher and child controlled two of the four buttons, drawing lines that went either up and down or left and right, and requiring collaboration to create diagonal lines. The interaction between the teacher and child was filmed for 8 min and a single video was created with the recording of the interaction and the recording of the drawings side by side. Sensitivity was coded using the revised Erickson 7-point rating scale for supportive presence (1 = *completely failing to be supportive*, 7 = *skillfully providing support throughout the session*) and intrusiveness (1 = *nonintrusive*, 7 = *highly intrusive*) (Egeland et al., 1990).

Higher teacher sensitivity was indicated by higher scores on supportive presence and the reversed intrusiveness scale. At each time point, the correlation between the two scales was substantial ($r = .43–.47$, $p < .001$), therefore, the scores on both scales were aggregated in a "teacher sensitivity score" reflecting the mean of their scores on the two rating scales. Four coders, including expert coder MBK who trained the other coders, independently coded the videos unaware of experimental condition, assessment moment and other data concerning the participants. Following the guidelines by Koo and Li (2016), intercoder reliability (ICC, single measure, absolute agreement, 22% of videos) was good (ICC = .85, range .82–.89). Monthly meetings were held to prevent coder drift.

Observed teacher sensitive discipline. Sensitive discipline of the teacher in interaction with the child was observed using an adapted version of the Do – Don't task (e.g. Runze et al., 2022). The teacher received a tablet with written instructions. First, teachers had to explain the child's task to the child: a monotonous and tedious task of sorting a large number of small beads by color. Meanwhile, the teachers played a video game with captivating sounds on a tablet. Teachers had to ensure that the child would not watch the screen but complete their task. Thus, the teachers had to set limits in two ways: ensuring that the child would engage in the not so attractive "do" task, and preventing the child from engaging in the attractive video game ("don't" task). The interaction between the teacher and child was filmed for 8 min. Sensitive discipline was rated with an adapted version of the revised Erickson 7-point rating scale for supportive presence (Egeland et al., 1990), incorporating strategies for gentle discipline in challenging situations such as distraction and understanding (1 = *completely failing to be supportive*, 7 = *skillfully providing support throughout the session*) (based on Kochanska, 1995; van Zeijl et al., 2007 and also used in; Euser et al., 2021; Runze et al., 2022; Yagmur et al., 2014). Although we used a similar scale to measure sensitivity, here it is applied in a different context, focusing on different teacher strategies for guiding child behavior. In addition, laxness in the disciplining strategies, reflecting inconsistent or lenient approaches to setting and enforcing limits, was

measured using a 5-point rating scale (1 = *no laxness*, 5 = *continuous laxness)*. Higher teacher-sensitive discipline was indicated by higher scores on supportive presence and lower scores on laxness. The correlation between the two scales was significant at T1 (r = - .55, $p < .001$) but not at T2 (r = −.18, $p = .168$), therefore, the scales were not combined. We choose not to use event-coding for these constructs, as in smaller samples this can often results in skewed distributions, similar to what we observed with for negative disciplining behaviors such as physical interference and hostility. Due to the highly skewed distributions of these ratings, they were excluded from the analyses.

MO independently coded 41 videos, while the remaining 67 videos were independently coded by pairs of coders trained by MO. Coders were unaware of experimental condition, assessment moment and other data concerning the participants. For each video, the pair agreed on a consensus score. Following the guidelines by Koo and Li (2016), intercoder reliability between MO and pairs of coders (ICC, average measures, absolute agreement, 22% of videos) was good for both supportive presence (ICC = .88, range: .81–.93) and laxness (ICC = .78, range: .73–.85).

Secondary outcome measures

Externalizing child behavior problems. Child behavior problems were measured using the (Caregiver-) Teacher Report Form (TRF for children in Grade 1 and 2; C-TRF for children in Kindergarten; Achenbach & Rescorla, 2001; Verhulst & Van der Ende, 2013). The TRF and C-TRF consist of, respectively, 118 and 99 items describing problem behavior, such as difficulty following directions, disturbing other students and disrupting classroom discipline. Teachers rated the degree of behavioral problems in the child for the last 2 months on a 0–2 scale (0 = *Not true (as far as you know)*, 1 = *Somewhat or sometimes true*, 2 = *Very true or often true*). The Cronbach's alpha values for the Externalizing behavior problems subscale from the TRF varied between .91 and .96, and for the C-TRF from .94 to .96, demonstrating excellent internal consistency at both time points.

Quality of the teacher–child relationship – teacher rating. Teachers completed the Student–Teacher Relationship scale (STRS, Pianta, 2001; LLRV; Koomen et al., 2007) to measure their perception of the quality of their relationship with the child. This questionnaire is often used to measure teacher's perceptions of the relationship and consists of 28 items. Teachers scored items (e.g. "When this child is in a bad mood, I know we're in for a long and difficult day") on a 1–5 scale (1 = *definitely does not apply*, 5 = *definitely applies*). Cronbach's alphas ranged between .83 and .87 for the total score indicating good internal consistency across both time points.

Quality of the teacher–child relationship – child rating. The Young Children's Appraisals of Teacher Support (Y-CATS; Mantzicopoulos & Neuharth-Pritchett, 2003) questionnaire was used to assess children's perception of the quality of the relationship with their teacher. The Y-CATS consists of 27 items, with a dichotomic response format, specifically designed for young children (i.e. 4–8-year-olds). With the assistance of a research assistant, children expressed agreement or disagreement with statements (e.g. "My teacher says nice things about my work") by placing a card in either a treasury box (*true*) or trashcan (*untrue*), minimizing the need for verbal responses. Item 18 ("My

teacher lets me choose where I sit") was removed due to its negative impact on the internal consistency. Cronbach's alphas ranged from .71 to .74 for the total scores indicating adequate internal consistency across both time points.

School happiness. The How I Feel About My School (HIFAMS; Allen et al., 2018) questionnaire was used to measure how children felt about school. The HIFAMS consists of seven items on different school-related situations (e.g. "When I am in the classroom, I feel . . . "). Children respond to each item on a 3-point scale with emoticons to convey their responses: *sad* (0), *OK* (1) and *happy* (2). A higher score on the questionnaire reflects greater happiness in school. Item 4 ("When I am in the playground, I feel . . . ") was removed due to its negative impact on the internal consistency. The resulting Cronbach's alphas across both time points (.72 and .73) were adequate.

Teacher self-efficacy regarding classroom management. Teacher self-efficacy was measured using the Ohio Sense of Teacher Efficacy Scale (OSTES – short version; Tschannen-Moran & Woolfolk Hoy, 2001). The questionnaire consists of three subscales, of which the subscale Efficacy in Classroom Management (4 items) was used in the current study, as this scale is most closely associated with the skills addressed in the VIPP-School program. Teachers responded to questions (e.g. "How much can you do to calm a student who is disruptive or noisy?") on a scale ranging from 1 (*Nothing*) to 9 (*A great deal*). Cronbach's alphas for the Classroom Management subscale were .87 and .91 for the two time points, indicating good to excellent internal consistency across both time points.

Observed supportive teacher–classroom interaction. Supportive interaction of the teacher with the classroom was observed during a 3-h classroom observation. The observations were live coded using the Child–Caregiver Interaction Scale – Early Elementary Education (CCIS-E; Starreveld et al., 2024b). This observation instrument was developed for this study by adapting the child-care Child–Caregiver Interaction Scale (CCIS, Carl, 2010) for use in elementary education. The CCIS-E consists of 11 scales covering three domains: Student Support (8 scales) Classroom Management (5 scales) and Cognitive Activation (4 scales), with some overlap in scales between domains. To measure supportive teacher–classroom interaction, the Student Support domain was selected as the most relevant scale. Each scale within this domain is rated on a 7-point rating scale (1 = *inadequate interaction*, 7 = *excellent interaction*), based on the presence or absence of specific behaviors. Ten coders, including KS and MO who developed the instrument in collaboration with the original CCIS developer and trained the other coders, coded the real-life observations. Intercoder reliability (ICC, single measure, absolute agreement, three dual observations) for the Student Support domain was good (ICC = .84, range .64–.96). When a coder observed both pretest and posttest, we used a consensus score with an independent second observer when possible (5 cases). In the remaining 13 cases, where a second independent observer was not available, we used the single coder's scores for both time points. To ensure that these single coder scores were reliable, we compared them to scores derived from imputed data with the original scores declared as missing. This comparison, based on

multiple imputation with 50 iterations, yielded a Pearson correlation of .77, warranting our decision to use the original scores for analyzing supportive classroom interactions rather than resorting to imputed data.

Data-analytic strategy

Missing values accounted for 6.4% of the data, distributed evenly across outcome measures. Because missingness was completely at random, as evidenced by Little's MCAR test (χ^2 (225) = 126.069, $p = .267$) multiple imputation (MI) was used. In this process, 50 datasets were imputed and subsequently merged using the *merge imputations* function from the *sjmisc* package in R. This function averages the values across all imputed datasets for each missing value, resulting in a single dataset for subsequent analyses. There were no outliers ($z < -3.29$ or $z > 3.29$).

To investigate intervention effects, intent-to-treat analyses were performed using repeated measures ANOVAs in SPSS version 28 with condition as the between-subjects factor and time as a within-subject factor. Post-hoc analyses were done using paired *t*-tests. The following sensitivity analyses were conducted: (1) including only those participants who received all five intervention sessions (95%), (2) including only schools from primary education (93%), excluding schools for special education for children with emotional/behavioral problems. To enhance comparability with meta-analytic data, effect sizes from the repeated measures ANOVA were converted to Cohen's *d* using Comprehensive Meta Analysis Software version 4.

A power analysis using G*Power 3.1 (Faul et al., 2007) based on repeated measures ANOVA with within-between subjects interaction effects, $\alpha = 0.05$ and effect size $f = 0.18$ (based on the meta-analytic effect size in Van IJzendoorn et al., 2023) showed that with our sample size of 58, the priori power was 0.69 for detecting intervention effects. Power and sample size are more modest than we originally intended, due to the consequences of the COVID-19 pandemic that coincided with the start of our study.

Results

Preliminary analyses

Table 3 shows descriptive statistics of the outcome variables.

Intervention effects on the primary outcomes

Repeated measures ANOVA for the primary outcome variables showed that the condition-by-time interaction effect was significant for sensitivity, $F(1, 56) = 9.35$, $p = .003$ ($d = 0.87$, [95% CI: 0.33 to 1.41]), see Figure 2. Post hoc analysis showed that teachers in the intervention group increased in sensitivity during interaction with the child, $t(27) = 2.77$, $p = .010$ ($d = 0.52$, [95% CI: 0.12 to 0.92]), while teachers in the control group showed a non-significant decrease in sensitive interaction, $t(29) = -1.47$, $p = .153$ ($d = -0.27$, [95% CI: −0.63 to 0.10]). See Table 3 for descriptive statistics.

For sensitive discipline, no interaction effect between condition and time was found for either supportive presence, $F(1, 56) = .625$, $p = .432$ ($d = 0.21$, [95% CI: −0.31 to 0.72]) or

Table 3. Means and standard deviations of all outcome variables at pretest (T1) and posttest (T2) for the intervention and control group.

	Intervention Group ($n = 28$)	Control Group ($n = 30$)
	M (SD) or *n (%)*	*M (SD)* or *n (%)*
Teacher characteristics		
Gender *(% female)*	25 (89%)	30 (100%)
Age	43.11 (12.03)[a]	40.90 (11.77)[b]
Years teaching experience	12.93 (9.28)[a]	11.93 (10.73)[b]
Working days p/week[c]	3.38 (1.13)	3.50 (1.11)[d]
Ethnic match with child	14 (50%) [e]	10 (33%) [f]
Religious match with child	14 (50%) [e]	10 (33%) [f]
Child characteristics		
Gender *(% female)*	9 (32%)	10 (33%)
Age	6.95 (1.50)	6.08 (1.21)
In therapy	10 (36%)	8 (27%) [b]
Classroom characteristics		
Grade *(% kindergarten)*	12 (43%)	17 (57%)
Group size	22.93 (4.49)	22.00 (6.00)[b]
School characteristics		
Primary education type	27 (96%)	27 (90%)
Regular education	1 (4%)	3 (10%)
Special education		
Religious denomination *(% yes)*	21 (75%)	15 (50%)
Number of children at school	281.79 (119.94)	242.8 (131.80)

Reported values are based on complete (sub)samples, sample sizes vary due to different response rates and data availability. [a] : $n = 27$, [b] : $n = 29$, [c] : Working days per week in the classroom of the participating child, [d] : $n = 28$ and [e] : $n = 26$.

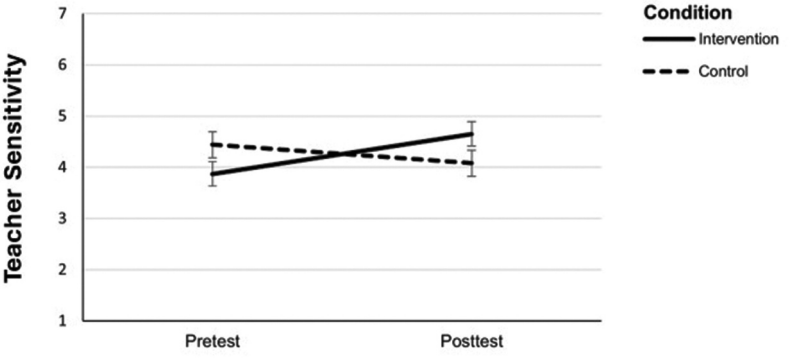

Figure 2. Changes in teacher sensitivity (M, SE) as a function of time and condition.

laxness, $F(1, 56) = 1.36$, $p = .249$ ($d = -0.35$, 95% CI [−0.87 to 0.17]), although the enhanced increase and decrease were in the expected directions, see Figures 3 and 4. There was a significant effect of time on laxness, $F(1, 56) = 8.26$, $p = .006$ ($d = -0.44$, [95% CI: −0.77 to −0.12]). Teachers in both the intervention and control groups showed a decrease in laxness over time (see Table 3).

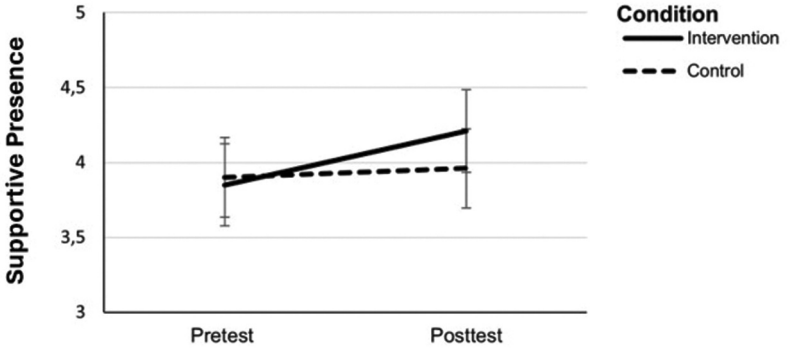

Figure 3. Changes in teacher sensitive discipline – supportive presence (M,SE) as a function of time and condition.

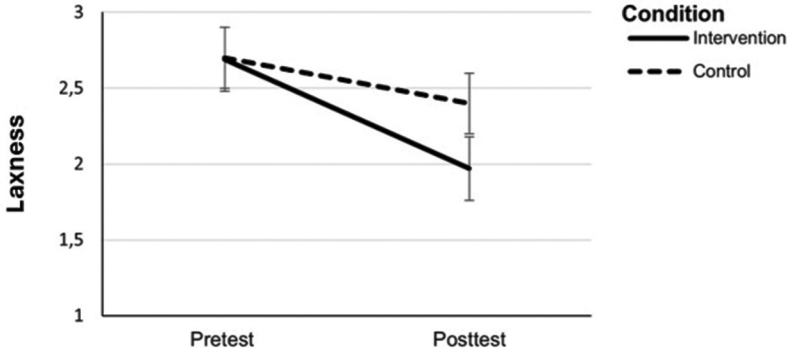

Figure 4. Changes in teacher sensitive discipline - laxness (M,SE) as a function of time and condition.

Intervention effects on the secondary outcomes

Repeated measures ANOVA showed no interaction effect between condition and time for externalizing behavior problems, $F(1, 56) = 0.11$, $p = .74$ ($d = -0.08$, [95% CI: −0.60 to 0.43]). However, there was a significant effect of time, $F(1, 56) = 8.09$, $p = .010$ ($d = -0.22$, [95% CI: −0.39 to −0.04]). Children in both groups displayed less externalizing behavior over time (see Table 3).

The interaction between condition and time for the teacher–child relationship quality as rated by the teacher fell just short of significance, $F(1, 56) = 2.97$, $p = .090$ ($d = 0.47$, [95% CI: −0.08 to 0.96]). However, there was a significant effect of time for the quality of the teacher–child relationship as assessed by the teacher, $F(1, 56) = 41.62$, $p = < .001$ ($d = 0.59$, [95% CI: 0.33 to 0.85]). Teachers in both groups reported that their relationship with the child improved over time (see Table 3). Additional exploratory analyses on subscale level showed a significant condition-by-time interaction effect for teacher-rated closeness in the relationship in the expected direction (see Supplement B). There was no significant

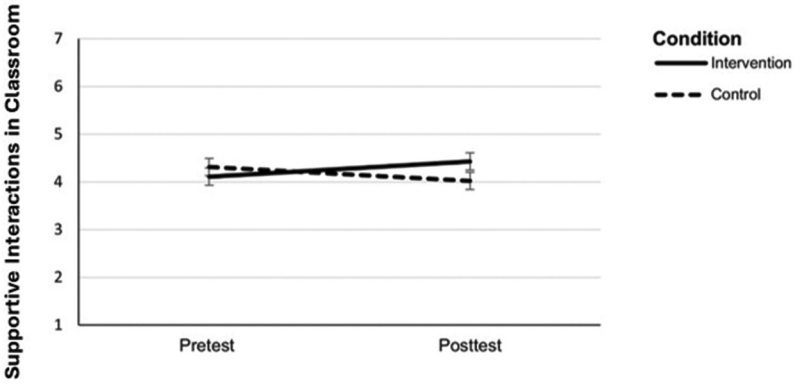

Figure 5. Changes in supportive interactions in the classroom (M, SE) as a function of time and condition.

interaction effect between condition and time for relationship quality as rated by the child, $F(1, 56) = .01$, $p = .908$ ($d = 0.08$, [95% CI: −0.60 to 0.43]).

There was no interaction effect between condition and time on school happiness, $F(1, 56) = 2.32$, $p = .134$ ($d = 0.44$, [95% CI: −0.08 to 0.96]). School happiness remained relatively stable over time for children in both groups (see Table 3). For teachers' reported self-efficacy regarding classroom management, no interaction effect between condition and time emerged either, $F(1, 56) = .77$, $p = .382$ ($d = 0.25$, [95% CI: −0.27 to 0.77]). However, the effect of time was significant, $F(1, 56) = 14.21$,
$p = < .001$ ($d = 0.41$, [95% CI: 0.17 to 0.65]). Teachers in both groups became more confident in their classroom management skills over time (see Table 3).

Lastly, for supportive interactions between the teacher and children in the classroom the condition-by-time interaction was significant, $F(1,56) = 4.47$, $p = .039$ ($d = 0.53$, [95% CI: 0.01 to 1.06]), as shown in Figure 5. Post hoc analysis showed a non-significant increase for teachers in the intervention group in supportive classroom interactions: $t(27) = 1.62$, $p = .117$ ($d = 0.31$, [95% CI: −0.08 to 0.68]) and a non-significant decrease in supportive behavior for teachers in the control group: $t(29) = -1.39$, $p = .174$ ($d = -0.25$, [95% CI: −0.62 to 0.11]). See Table 3 for descriptive statistics.

Sensitivity analyses

In two sensitivity analyses, 1) including the control group and only those intervention group participants who received all five intervention sessions (95% of the teacher–child dyads), and 2) including only participants from regular education (93% of participants; excluding participants from special primary education) the results largely mirrored those of the main analyses, although the interaction between condition and time fell just short of significance for supportive interactions in the classroom in both analyses, respectively $F(1,53) = 3.80$, $p = .056$ ($d = 0.52$, [95% CI: −0.02 to 1.06]) and $F(1,52) = 3.72$, $p = .059$ ($d = 0.53$, [95% CI: −0.02 to 1.07]). The effect sizes were

comparable to the main analyses, suggesting that the sensitivity analyses were underpowered to render the effect statistically significant.

Discussion

Teachers play a crucial role in supporting the social and behavioral competence of young children in their classrooms (Hamre & Pianta, 2001; McGrath & Van Bergen, 2015; Roorda et al., 2021; Vandenbroucke et al., 2017). Attachment-based interventions may be valuable for teachers who face challenges in interacting with children with behavioral problems. In this study, we investigated the effects of VIPP-School on teacher sensitivity and sensitive discipline in early elementary school teachers. We found a significant effect of the intervention on sensitivity, but not on sensitive discipline. Additionally, we explored potential intervention effects on secondary outcome measures: child externalizing behavior problems, teacher–child relationship quality, school happiness, teacher self-efficacy and supportive teacher–classroom interactions. We found a significant effect of the intervention on teacher reported closeness in the relationship and supportive teacher–classroom interactions.

The VIPP-School program had a positive impact on the level of teacher sensitivity in dyadic interaction with the child. Teachers in the intervention group improved in their sensitive responses over time, while teachers in the control group remained stable. This finding is in line with meta-analytic evidence (Juffer et al., 2017; Van IJzendoorn et al., 2023). VIPP-School enhanced teacher sensitivity with a large effect size: $d = 0.87$ (95% CI: 0.33 to 1.41). The confidence interval of our effect size overlaps with the confidence interval from recent meta-analytic findings ($d = 0.37$, [95% CI: 0.24 to 0.47], Van IJzendoorn et al., 2023). Werner et al. (2018) also observed an increase in sensitivity during structured tasks within a professional context (center-based childcare), suggesting that VIPP-School is effective in enhancing caregiver sensitivity in professional environments.

Contrary to our expectations informed by meta-analytic findings (Juffer et al., 2017; Van IJzendoorn et al., 2023), VIPP-School did not show the expected effect on teacher-sensitive discipline. While the results indicated a larger increase in supportive presence and larger decrease in laxness in the intervention group than in the control group (see Figures 3 and 4), our study was underpowered to detect a significant effect on teacher-sensitive discipline. Detecting an effect size of $d = 0.21$ for supportive presence would require a sample size of 298, while an effect size of $d = -0.35$ for laxness requires a sample of 110 participants (G*Power 3.1; Faul et al., 2007). These are not unrealistic numbers (see, e.g. O'Farrelly et al., 2021; Van Zeijl et al., 2006), but beyond our current sample size.

Child characteristics may also play a role in the absence of significant intervention effects on sensitive discipline. The children in our sample had relatively low externalizing scores at pretest ($M = 0.83$, $SD = .39$, possible range 0–2). Future larger studies may test the moderating effects of externalizing behavior at baseline, to examine whether intervention effects on sensitive discipline may be stronger in teachers dealing with children with higher levels of externalizing behavior. Somewhat related to this issue, the focus of the intervention may have been more on sensitivity than on sensitive discipline, as most children easily complied with instructions during tasks aimed at providing video footage for improving teachers' sensitive disciplining. Analysis of the feedback scripts supports this hypothesis: there was little focus on sensitive discipline in connection to the video-

captured tasks, while numerous messages related to sensitivity. In future applications, it may be useful to discuss with teachers what settings would elicit child non-compliance, in order to ensure sufficient video footage for feedback on sensitive discipline.

Regarding the secondary outcomes, we found a significant effect of the intervention on teacher reported closeness in the relationship, but not externalizing behavior problems, overall teacher–child relationship quality, school happiness, or teacher self-efficacy regarding classroom management. These outcomes would be considered indirect effects of VIPP-School, as they are supposed to result from changes in caregiving behavior (Van IJzendoorn et al., 2023). Therefore, these targets are more challenging to positively influence and changes may require more time to be established. Future research should investigate whether such effects occur over time and, if so, how much time is needed for changed teacher behavior to be visible in these more distal effects. While these indirect targets are more difficult to change, some RCTs with VIPP-SD have found a reduction in child behavior problems, notably also in the long term (Juffer et al., 2009, 2017; O'Farrelly et al., 2021; Van Zeijl et al., 2006). Additionally, there have been observed effects on increased parental self-efficacy in samples of children with autism and children with visual and visual-and-intellectual disabilities (Platje et al., 2018; Poslawsky et al., 2015). A potential explanation for the absence of an intervention effect on teacher self-efficacy could be that we measured general teacher self-efficacy, rather than student-specific teacher self-efficacy. Research suggests that teacher self-efficacy is not a stable trait but varies depending on the interaction with a specific student (e.g. Zee et al., 2016). Given that VIPP-School focuses on teacher–child dyads, future research could benefit from examining effects on student-specific teacher self-efficacy.

Considering the extensive research on the effects of VIPP-SD on behavior problems, the lack of a significant impact on child externalizing behavior in our study (where the effect was in the expected direction and amounted to $d = -0.08$) could be attributed to the relatively low levels of externalizing behaviors in our sample, especially in children who attended regular education (93%). Additionally, there was a significant effect of time on the teacher reported externalizing behavior problems ($d = -0.22$), with decreases observed in both the intervention and control groups. This decrease might be linked to the control group's conversations about child development, having potentially altered the teachers' perceptions of children's behaviors. With a more flexible mental model of teacher–child interaction, teachers might have started interpreting interaction patterns as more neutral or positive than before (Bosman et al., 2012; Spilt et al., 2012).

With an exploratory aim, we probed for an intervention effect beyond the teacher–child dyad, based on the observation of teacher–classroom interaction. We found that teachers who had participated in VIPP-School showed more supportive interactions with the children in their classroom than teachers in the control group. Considering the educational context, the effect size of VIPP-School on supportive interactions with the classroom can be considered as a large effect ($d = 0.53$, [95% CI: 0.01 to 1.06]) (Kraft, 2020).

Limitations, strengths and future directions

The findings of this study should be interpreted considering some strengths and limitations. Notably, this study was registered prior to analysis, enhancing the reproducibility and transparency of the results. By conducting an RCT and using

intent-to-treat analyses, we have implemented a robust method to examine causality and the direction of associations between the intervention and teacher practices. It is important to note that the quality and generalizability of randomized controlled trials can differ, especially when relying on self-report data (Bakermans-Kranenburg et al., 2003). To mitigate this concern, we used observation by trained coders for the primary outcome measures. Self-reports were only employed for constructs where self-assessment was deemed most appropriate, and the selected questionnaires demonstrated adequate to good internal consistency. In observing teacher–classroom interaction, maintaining observer blindness to condition was challenging at times during live posttest observation of the classroom interactions, especially when teachers, despite explicit instructions not to, inadvertently disclosed intervention details. To mitigate this issue in future studies, recording classroom interactions and having them coded by trained raters blind to the study conditions would be an effective strategy, although it introduces new complications. For example, a video can only capture a portion of the classroom, limiting the observer's perspective, and informed consent of all children in the classroom (and their parents) would be needed.

An important strength of the study was the high treatment fidelity of VIPP-School, with the intervention being delivered as intended in all cases. VIPP-School belongs to the category of teacher coaching programs with a relatively short duration and modest investments in equipment and training of interveners. Additionally, the intervention's delivery method, where visits align with regular school hours, may have contributed to the high level of acceptability among participants, as evidenced by the very high retention rate (93%). Similar to findings in Werner et al. (2018), it seems that some teachers in our active control group may have been misled by the label "online consultation" for the dummy-intervention, as evident from their requests for more information and some instances of drop-out from the intervention due to dissatisfaction with the treatment offered. Additionally, the use of an active control group may have introduced unintended effects, such as teachers feeling supported by the opportunity to discuss their experiences. This could explain the lack of significant effects on some outcome measures. However, we believe that the incorporation of an active control group strengthens the study, as it provides a more robust comparison and helps control for John Henry effects.

A notable study constraint was the small sample size, which reduced the power to detect significant intervention effects and precluded the possibility of conducting subgroup analyses for a more in-depth examination of effects. This limitation arose from the unprecedented impact of the COVID-19 pandemic on our research activities, as school closures and disruptions made it challenging to recruit teachers for participation. Additionally, the absence of a large number of follow-up assessments prevents long-term evaluation of the intervention, making it difficult to identify any delayed effects that might emerge over time. Conducting long-term follow-up measures is particularly challenging in schools where children change teachers every year, as is common in the Netherlands. Nonetheless, investigating long-term follow-up effects would be valuable to explore long-term effects as well as transferability of teacher skills across different groups of children.

Conclusion

The findings of the current RCT suggest that early elementary school teachers may become more sensitive and supportive in the way they interact with children after receiving coaching with the video-feedback program VIPP-School, in one-to-one interaction as well as in the classroom. Teachers benefit from VIPP-School, probably as it makes them aware of and reflect on (sometimes subtle or challenging) child signals and helps them respond in a sensitive way.

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Disclosure statement

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Data availability statement

Due to confidential and legal regulations only pseudonymized data will be shared upon request. Requests can be made to the corresponding author. Data sharing starts 1 year after the end of the project in Yoda research data management database. The data will be shared after approval of the request for data sharing and establishing a Data Sharing Agreement.

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