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Early anxiety prevention through a live, online group-based parenting program: Effectiveness in a randomized controlled trial

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ABSTRACT

Anxiety problems are one of the most prevalent mental health conditions in children, placing a significant burden on families and mental health services. This creates an urgent need for early and accessible preventive interventions that maintain clinical effectiveness while optimizing time and costs for both families and therapists. The present study examined the effectiveness of an evidenced-based preventive anxiety parenting intervention, delivered in a live, online, group-based format using a randomized controlled trial ($N = 148$). Parents of behaviorally inhibited children aged three to six years were allocated to either the intervention, a Dutch adaptation of 'Cool Little Kids', or a control condition consisting of a book with general parenting advice. To enhance ecological validity, the study was conducted in a naturalistic setting in collaboration with Dutch public and mental health organizations. Linear mixed models analyses ($n = 128$) demonstrated that parents in the intervention condition reported lower child anxiety symptoms than those in the control condition at post-intervention ($d = -.35$), six and twelve month follow-up ($d = -.46$ and $d = -.31$). Group differences were no longer statistically significant at the twelve month follow-up, potentially due to gradual improvements within the active control condition and the possibility that the study was underpowered to detect smaller intervention effects. However, effect sizes remained comparable to post-intervention, suggesting sustained long-term clinical relevance. Overall, these findings provide novel evidence for live, online, parent-focused, group-based delivery as an effective approach to reducing anxiety symptoms in young, anxiety-prone children.

Clinical trial registry: This trial was prospectively registered in the Netherlands Trial Register (NL9633).

1. Introduction

Anxiety disorders are among the most common mental disorders in childhood and their prevalence is still increasing. Approximately 7.9% of children and adolescents currently suffer from an anxiety disorder and its estimated lifetime prevalence is even 34% (Bandelow & Michaelis, 2015; Bie et al., 2024; Sacco et al., 2024; Strawn et al., 2021). Because anxiety problems typically emerge at an early age (Solmi et al., 2022), they interfere with young children's daily functioning, potentially leading to severe impairment and comorbid problems later in life (Jamnik & DiLalla, 2019; Stevanovic, 2013; Vasileva et al., 2021). This high prevalence and associated burden place substantial pressure on mental healthcare systems, which are increasingly struggling to meet the growing demand for care. Characterized by a reliance on

resource-intensive, specialist-delivered, and often face-to-face treatment models, these systems currently face persistent challenges such as long waiting lists, high costs, and a scarcity of trained professionals (Creswell et al., 2020; Fan et al., 2025; Patel et al., 2023). These systemic challenges and the high burden of anxiety problems highlight the need to shift toward implementing efficient and accessible approaches to prevent the development of anxiety disorders early in life.

Effective prevention strategy in early childhood requires a clear understanding of the risk factors contributing to the development of anxiety disorders. Among these, a behaviorally inhibited temperament (BI) is one of the most consistent and well-established predictors. BI refers to an early-emerging temperamental disposition marked by heightened fearfulness and withdrawal in novel and unfamiliar situations (Fox et al., 2005). BI shows moderate stability across development,

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with high levels observed in approximately 15–20% of children (Chronis-Tuscano et al., 2009). Meta-analytic findings demonstrate that these children are at substantially elevated risk of developing anxiety problems, with particularly strong associations observed for social anxiety disorder (Clauss & Blackford, 2012; Sandstrom et al., 2020).

Still, not all young children with high levels of BI eventually develop an anxiety disorder (Clauss & Blackford, 2012; Degnan & Fox, 2007), as the onset of anxiety is not determined by just this one risk factor. Instead, the risk for developing an anxiety disorder is multifactorial, including family and environmental factors (Rapee et al., 2023; Warner & Strawn, 2023). Fox et al. (2023) reported that caregivers play a crucial role in moderating and mediating the developmental trajectory of inhibited children; they can either facilitate or prevent the development of anxiety problems. Especially parenting behaviors such as over-protection and parents' verbal responses to potential threats seem to be of high importance (Fox et al., 2023; Nimphy et al., 2024), making parents a key target for preventive efforts.

Meta-analyses confirm that parent-focused interventions are effective in preventing anxiety symptoms in children (Rienks et al., 2025; Yap et al., 2016). For targeted preventive interventions specifically, these meta-analyses reported effect sizes ranging from small to large ($d = -.23$ to $d = -1.13$). However, these estimates should be interpreted with caution, as they were based on few trials and did not consistently reach statistical significance. Furthermore, this evidence comes predominantly from trials with school-aged children. Considerably less is known about the effects of preventive parenting interventions for preschool-aged children.

To advance this understanding without increasing the burden on the healthcare system, group-based parenting interventions tailored for early childhood represent a promising solution. This format is uniquely suited for this young age group and allows clinicians to serve multiple families simultaneously, directly alleviating the systemic pressures outlined earlier. Additionally, group delivery offers unique therapeutic elements such as peer modeling, normalization of experiences and mutual support, while achieving comparable outcomes to individual formats (Barlow et al., 2016; Mathijs et al., 2024). These group processes may strengthen engagement and parents' confidence in applying new strategies, which could in turn enhance treatment effects. A prominent example is the Australian Cool Little Kids (CLK) intervention (Rapee et al., 2005), a group-based anxiety prevention program targeting parents of young children with elevated levels of BI. Evaluations of CLK demonstrated reductions in child internalizing symptoms and lower incidence of anxiety disorders, with effects maintained up to eleven years in the original trial (Rapee, 2013) and up to two years of follow-up in a population-based translational trial (Bayer et al., 2021). These trials were included in a recent meta-analysis of interventions for inhibited preschoolers (Ooi et al., 2022) which confirmed that these targeted approaches yield a moderate reduction in parent-reported anxiety symptoms (Standardized Mean Change = $-.47$) and reduce the risk of developing an anxiety disorder by 25%.

Despite these promising outcomes, the evidence base for such interventions and young age group remains scarce and has predominantly been investigated in a limited number of countries, mainly Australia and the United States (Ooi et al., 2022). Furthermore, traditional in-person delivery formats can pose significant practical challenges, as travel time, transportation, and scheduling difficulties may discourage participation among families (Cooper et al., 2022; Olofsson et al., 2016). This complicates the efforts to implement and evaluate these interventions more widely. These barriers call for a delivery format that preserves therapeutic quality, while reducing the burden on families. Online delivery may address these challenges by removing these logistical obstacles, thereby improving accessibility (Canário et al., 2025). Yet evidence for the effectiveness of online parenting programs for the prevention of anxiety disorders is limited, as the majority of online programs target interventions for disruptive behavior problems (Canário et al., 2025; Corrales & Domenech Rodríguez, 2018;

Flujas-Contreras et al., 2019). Moreover, most available online parenting programs are asynchronous and self-paced, meaning that parents complete the material individually without real-time interaction (Canário et al., 2025). As a result, they miss opportunities for immediate interaction with peers and clinicians, processes that are thought to be central to the effectiveness of group-based interventions.

To address these limitations, the current study evaluated the effectiveness of the CLK intervention, delivered in a live, online format. By examining this delivery format, we provide new evidence on whether interactive, group-based, online parenting programs for childhood anxiety can achieve effects comparable to in-person programs investigated in previous studies. In addition, the study aimed to enhance the applicability of the findings by investigating the intervention as implemented in routine clinical practice. This is particularly relevant because prior research on preventive parenting programs has largely relied on highly controlled efficacy trials (Canário et al., 2025; Rienks et al., 2025; Yap et al., 2016). As differences in health care systems, cultural norms, and service availability may influence both program implementation and outcomes, the external generalizability of these findings remains limited. Accordingly, this study examined the live, online, group-based CLK intervention implemented in a naturalistic setting in the Netherlands, specifically aiming to determine its effectiveness in reducing anxiety symptoms (i.e., separation anxiety, specific phobias, social anxiety, and generalized anxiety) in inhibited children aged three to six years. We hypothesized that parents who were offered the CLK intervention would report lower child anxiety symptoms at post-intervention and follow-up. Ultimately, this study provided novel insights into whether an evidence-based early childhood anxiety prevention program is effective when delivered in a live, online format within a real-world context.

2. Methods

2.1. Study design

We used a randomized controlled trial design, comparing the adapted CLK intervention with a control condition in accordance with CONSORT 2025 guidelines (Hopewell et al., 2025). The CONSORT checklist is included in Appendix A. Before commencing the study, the trial was registered in the Netherlands Trial Register on 26 July 2021 (NL9633) and ethical clearance was granted by the METC LDD (N21.079; determined not to be subject to the Medical Research Involving Human Subjects Act) and the Psychology Research Ethics Committee of Leiden University. In line with earlier studies investigating preventive anxiety interventions (Yap et al., 2016), assessments were conducted at four moments: pre-intervention (T0), post-intervention (T1), six month follow-up (T2), and twelve month follow-up (T3).

2.2. Participants

Participants were parents of a total of 148 children, of whom 75 were allocated to the intervention condition and 73 to the control condition. One parent per child was invited to participate in the research assessments, while both parents were encouraged to take part in the intervention or control program. To be eligible for inclusion, parents were required to (i) have sufficient command of the Dutch language and (ii) provide written informed consent. In addition, their child (iii) had to be between three and six years old and (iv) was required to be classified as highly inhibited, based on a score > 42 on the Behavioral Inhibition Questionnaire-Short Form (see section 2.5.1). Parents were ineligible for participation if (i) they were in acute psychiatric care, (ii) their child was receiving treatment for an anxiety disorder, or (iii) the research team determined that child's anxiety symptoms already caused significant interference with daily functioning, such that a treatment program would be more appropriate than participating in the current preventive intervention.

2.3. Procedures and setting

Prior to data collection, a sample size calculation was performed to determine the number of participants needed to detect an intervention effect with adequate statistical power. Based on an effect size of .44 (Kennedy et al., 2009), a p -value of .05, a power of .80, and a correlation of .60 between the repeated measures, each condition required at least 59 participants. To account for an expected dropout rate of approximately 20% (Rapee et al., 2005), we aimed to recruit 74 participants per condition.

We aimed to investigate the intervention in real-world circumstances to maximize the applicability of the findings. To this end, we collaborated with several Dutch mental and public health organizations, which supported both participant recruitment and intervention delivery. To reach eligible parents, existing public health promotion and prevention recruitment strategies were used, organized in cohorts to enable group-based delivery of the intervention. First, parents were recruited via a screening questionnaire (16.9%; $n = 25$). This questionnaire was administered by the Public Health Services prior to a regular health check with a youth health care professional when their child reached the

age of five. Parents whose responses indicated potential eligibility were informed about the opportunity to participate in the study. Additionally, youth health care professionals could directly refer potentially eligible children to the research project (17.6%; $n = 26$). To ensure that the required sample size would be achieved, parents were also targeted through the distribution of posters and flyers about the project and media outreach (45.2%; $n = 67$). Finally, increasing awareness of the project also led to referrals by acquaintances (8.8%; $n = 13$) or via other routes (11.5%; $n = 17$).

Parents who expressed interest in participating in the research project received an information letter and informed consent form. Eligibility was subsequently verified by the research team through a screening questionnaire and a brief structured telephone intake, addressing the in- and exclusion criteria. The intake protocol incorporated questions from the Diagnostic Infant and Preschool Assessment clinical anxiety interview (see section 2.5.3) and the Selective Mutism Questionnaire (Rodrigues Pereira et al., 2024). Through these questions, we assessed whether the anxiety symptoms already significantly interfered with the child's daily functioning. Additionally, we screened for potential clinical conditions whose symptoms overlap with BI but

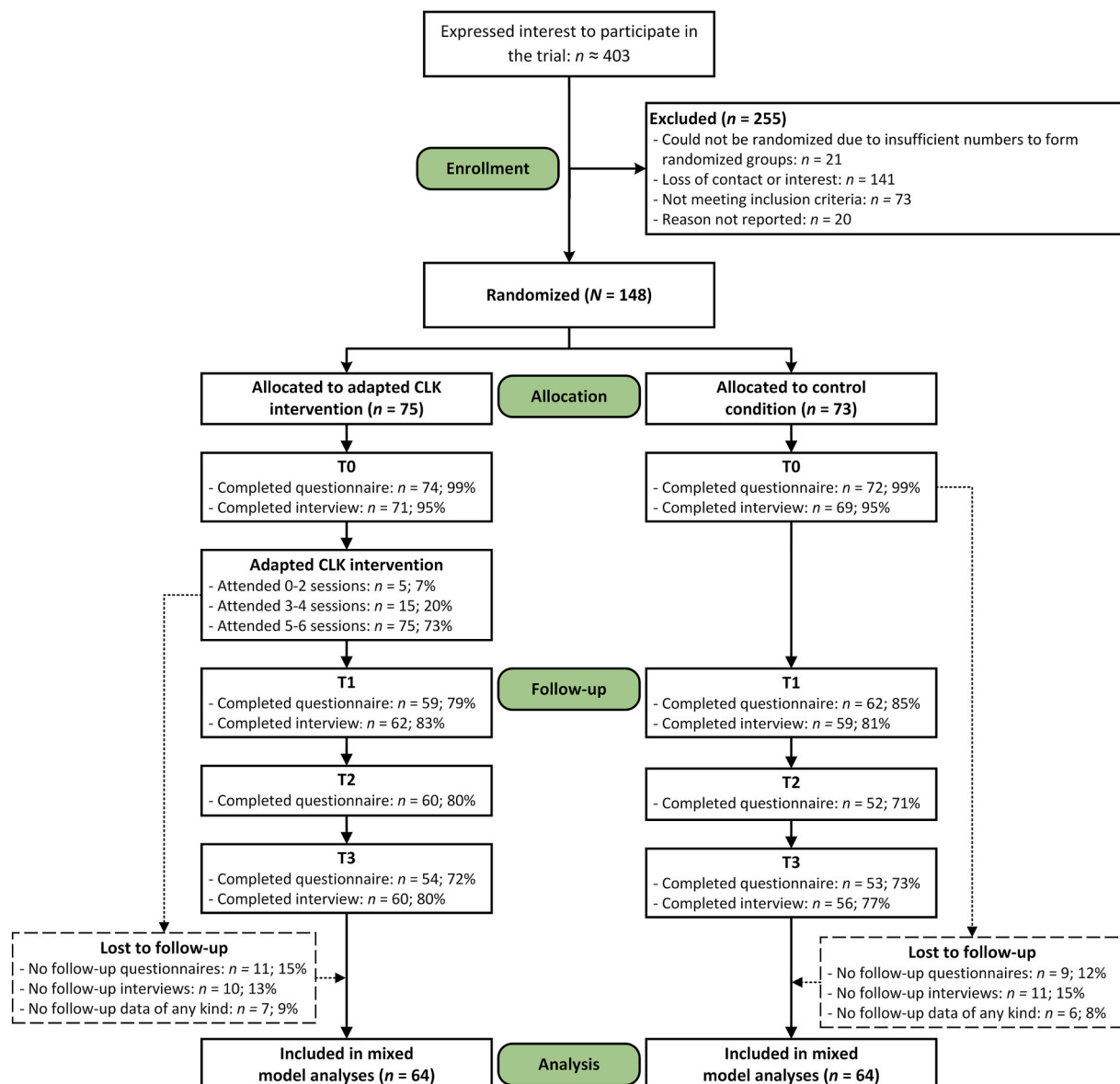


Fig. 1. Participant flowchart.

require specialized care (e.g., selective mutism, trauma-induced symptoms). In cases of doubt, the wider research team, including a child psychiatrist specialized in infant mental health, was consulted to reach a consensus. Excluded families based on these criteria were advised to contact their general practitioner for further psychological evaluation.

Following consent, participants completed an online baseline questionnaire (distributed with Qualtrics) and participated in an online clinical anxiety interview (conducted via a videoconferencing platform). Once enough participants had enrolled to form one intervention and control group cohort (between 12 and 16 participants), they were randomly allocated to either the intervention or control condition using the [random.org](#) list tool. The randomization procedure was performed by NK and independently verified by LV, neither of whom were involved in the telephone intakes with potential eligible participants and conducting the clinical anxiety interviews. This ensured an independent randomization process, with all personnel involved in screening and interview assessments blinded to allocation. In total, ten randomized intervention and control group cohorts were formed between September 2021 and May 2023. The participant flow chart is presented in [Fig. 1](#).

2.4. The intervention

The intervention was a Dutch adaptation of the Australian CLK intervention. This group-based parenting program aims to prevent anxiety disorders in children aged three to six years with elevated levels of BI ([Rapee et al., 2005](#)). The Dutch translation of the original manual was used, with the delivery format adapted to live, online sessions through a videoconferencing platform. Details on the delivery and implementation of the intervention within the present trial are described in a process evaluation ([Komrij et al., 2026](#)). To facilitate interpretation of the current trial, the main components of the intervention and its delivery are described below.

The CLK intervention consisted of six manualized 90-min sessions with groups of parents representing six to eight children, delivered over approximately ten weeks. Based on cognitive behavioral therapy (CBT), the intervention combined psychoeducation, parenting strategies, and parent-led gradual exposure exercises to help children overcome their fears. Specifically, parents were taught the following strategies: (i) adopting non-overprotective approaches to cope with the child's inhibited behaviors, (ii) implementing in-vivo exposure through anxiety hierarchies, and (iii) practicing realistic thinking to address parents' own worries. Each group was facilitated by two therapists with a background in Psychology or Child Studies, who were trained in CBT and certified through the Dutch CLK train-the-trainer. Parents attended an average of 4.85 out of six sessions ($SD = 1.42$) and rated their satisfaction with the intervention at an average of 4.44 on a scale from 1 to 5.

The control condition consisted of the Dutch translation of the book 'How to Talk to Kids' originally written by Adele Faber and Elaine Mazlish. This book contained basic parent advice for parents with a child aged 2-20 years. Across its seven chapters, it outlines strategies for responding to children's emotions, encouraging cooperative behavior, setting limits, and supporting children in taking responsibility for their own behavior. The information provided was largely generic and did not address anxiety or inhibition. Parents were instructed to read the book at their own pace and did not receive any additional guidance. At T1, parents had read an average of 3.45 out of seven chapters ($SD = 2.40$), rising to 5.00 chapters ($SD = 2.47$) at T3 and rated their satisfaction with the book at an average of 3.91 on a scale from 1 to 5.

2.5. Measures

The RCT was designed to address multiple aims, including intervention effectiveness, implementation ([Komrij et al., 2026](#)), cost-effectiveness, and potential mechanisms of change. To address these aims, the study included a parental and child questionnaire, a parental clinical anxiety interview, and intervention sessions

observations. These instruments covered BI, child anxiety, parental anxiety, parental overprotection, quality of life, healthcare costs, satisfaction, and implementation-related outcomes. Only the measures relevant for the current study are described in detail below.

2.5.1. Behavioral inhibition questionnaire - short form (eligibility screening instrument)

The short version of the Behavioral Inhibition Questionnaire (BIQ-SF) was used as a screening instrument to identify children with high levels of BI for inclusion in the study. The BIQ-SF is a 14-item parental questionnaire designed for children aged 2.5-6 years ([Edwards, 2007](#); [Vreeke et al., 2012](#)). Parents rated the frequency of children's inhibited behaviors on a six-point scale ranging from 1 (hardly ever) to 6 (almost always). At the request of collaborating public health professionals (see also [Komrij et al., 2026](#)), a modified version of the BIQ-SF was employed that rephrased negatively framed items to improve interpretability for parents, with four items rephrased and reverse-scored (e.g., 'My child does not like to be the center of attention' was changed into 'My child likes to be in the center of attention'). Total scores were calculated by summing the item ratings (range 14-84). Strong psychometric properties have been reported for both versions of the BIQ-SF ([Edwards, 2007](#); [Guimarães & Trkulja, 2025](#); [Vreeke et al., 2012](#)). In the current sample, the BIQ-SF showed acceptable internal consistency ($\omega_{\text{total}} = .78$).

Given that approximately 20% of children exhibit elevated levels of BI ([Chronis-Tuscano et al., 2009](#)), children were classified as highly inhibited when scoring above the 80th percentile of BIQ-SF scores derived from a community sample ([Vreeke et al., 2012](#)). This corresponded to a total score of > 42 , which was used as a cut-off score to identify eligible participants.

2.5.2. Preschool Anxiety Scale - revised (parental questionnaire outcome measure)

The Preschool Anxiety Scale - Revised (PAS-R), a modification of the Preschool Anxiety Scale ([Spence et al., 2001](#)), is a parental questionnaire that measures anxiety symptoms in young children ([Edwards et al., 2010](#)). The PAS-R consists of 30 items, each rated by the parent on a 5-point Likert scale ranging from 0 (not at all true) to 4 (very often true). The questionnaire comprises four subscales: separation anxiety (5 items; range 0-20), specific phobias (9 items; range 0-36), social anxiety (7 items; range 0-28), and generalized anxiety (7 items; range 0-28). A total score (primary outcome; range 0-120) and subscale scores (secondary outcomes) were calculated by summing relevant item ratings. All subscales have shown acceptable reliability and validity in prior studies ([Broeren & Muris, 2008](#); [Edwards et al., 2010](#)). Internal consistency in the current study was moderate to excellent across all timepoints for the PAS-R total score ($\omega_{\text{total}} = .87 - .93$), separation anxiety ($\omega_{\text{total}} = .79 - .88$), specific phobias ($\omega_{\text{total}} = .75 - .84$), social anxiety ($\omega_{\text{total}} = .88 - .92$), generalized anxiety subscale score ($\omega_{\text{total}} = .83 - .87$).

2.5.3. Diagnostic Infant and Preschool Assessment (diagnostic interview outcome measure)

In line with the earlier studies investigating the original CLK intervention (e.g., [Bayer et al., 2018](#); [Rapee et al., 2005](#)), we also administered a clinical anxiety interview as a secondary outcome measure. We used the Diagnostic Infant and Preschool Assessment (DIPA), a semi-structured parental clinical interview for the classification of several childhood psychiatric disorders in children aged 2-7 years based on the DSM-V ([Gigengack et al., 2020](#); [Scheeringa & Haslett, 2010](#)). In the current study, only the separation anxiety disorder, specific phobias, social anxiety disorder, and generalized anxiety disorder modules were administered at baseline, post-intervention and twelve-month follow-up. Each module consisted of two parts: the assessment of symptoms belonging to the disorder and the assessment of interference of the present symptoms with the daily life of the child. The psychometric properties of the separation anxiety disorder module have been investigated, showing good results regarding reliability and validity

(Gigengack et al., 2020; Scheeringa & Haslett, 2010). No information is available for the other three modules. The DIPA interviews were conducted and scored by trained master Psychology students and research assistants who were blind to intervention allocation. To ensure high interview quality and inter-rater reliability, all interviewers attended weekly interview sessions.

2.6. Statistical analysis

Data were cleaned in IBM SPSS Statistics (version 29) and further analyzed using R (version 4.3.3; R Core Team, 2024). Descriptive statistics were computed for all variables to describe the study population. To assess the intervention effects on child anxiety symptoms, we performed repeated-measures analyses using linear mixed models, with the PAS-R total anxiety score (primary outcome) and the four anxiety subscale scores (secondary outcomes) as the dependent variables.

Observations (level 1) were nested within participants (level 2), who were clustered in ten intervention and control group cohorts (level 3). First, the intraclass correlation coefficient (ICC) was estimated for the PAS-R total score using an empty model with a participant-level random intercept to quantify the within-person dependence in the repeated measures ($ICC = .769$). The fixed part of the model was specified a priori and included condition (i.e., intervention or control condition), follow-up time (i.e., T1, T2 or T3) and their interaction to examine group differences and their changes in PAS-R scores over the follow-up period. In addition, baseline PAS-R scores, child age, and sex were included to adjust for initial differences in PAS-R total and subscale anxiety scores (Twisk et al., 2018) and demographical variability. We evaluated increasingly complex random-effects structures using restricted maximum likelihood (REML) likelihood-ratio tests and retained the best-fitting structure at each step. A participant level random intercept and a random slope for time significantly improved model fit, whereas cohort level random effects did not. Thus, the final model only included participant level random effects.

Estimated marginal means (EMM) were derived from the mixed models to assess differences between the intervention and control condition at each follow-up assessment through pairwise simple-effect tests. To account for multiple testing across these comparisons, p -values for each outcome were adjusted using the Holm procedure. Between-condition effect sizes (Cohen's d) were calculated by dividing the between-condition differences estimated by the mixed models by the pooled baseline standard deviation of the PAS-R scores (Morris & DeShon, 2002).

Analyses were conducted according to a modified intention-to-treat (m-ITT) principle, including all participants who completed at least one follow-up questionnaire ($n = 128$), regardless of intervention adherence (see also Fig. 1). This approach was chosen because it preserves the key principles of ITT through the minimization of potential bias associated with non-adherence and the support of a robust and meaningful evaluation of intervention effects. It also maximizes the use of available data and is consistent with the use of our linear mixed models, which incorporated all participants with at least one follow-up outcome measurement. Finally, it eliminated the need for data imputation, while producing comparable estimates to a full ITT analysis (Twisk et al., 2020). To evaluate whether the m-ITT sample remained representative of the total sample, baseline characteristics were compared between the m-ITT sample and the participants that were excluded due to missing data at all follow-up moments ($n = 20$), using independent sample t -tests for continuous baseline variables and chi-square or Fisher's exact tests (when expected cell counts were < 5)

for categorical variables.

Finally, two post hoc sensitivity analyses were conducted for the primary outcome to examine the robustness of the intervention effects. The first analysis excluded participants who reported receiving additional support for their child during the study period, to assess whether concurrent support influenced the observed intervention effects. The second analysis excluded participants who met criteria for any DIPA anxiety disorder classification at baseline, to evaluate whether the findings were comparable with a fully subclinical sample, consistent with the preventive focus of the intervention. The mixed models were refitted on these restricted sample and parameter estimates were compared with those from the full m-ITT analyses.

3. Results

3.1. Participant flow and attrition

As shown in Fig. 1, parents of 146 children completed the T0 questionnaire (attrition: 1%), 121 the T1 questionnaire (attrition: 12%), 112 the T2 questionnaire (attrition: 24%), and 107 the T3 questionnaire (attrition: 28%). In total, 128 participants (87%) completed at least one of the follow-up questionnaires and were included in the mixed model analyses. Not completing any of the follow-up questionnaires (T1, T2, and T3) was not significantly associated with intervention allocation or participants' baseline characteristics. An overview of the characteristics of the participants with and without follow-up data can be found in Appendix B.

3.2. Participants characteristics

The full sample consisted of parents of 148 children with a mean age of 4.58 years ($SD = 1.05$), of whom 57.5% were girls and 93% were born in the Netherlands. In 75% of these families, both parents were also born in the Netherlands. 88.4% of the questionnaires were completed by the child's mother, whose mean age was 36.96 years ($SD = 4.33$). A complete overview of the baseline characteristics for the total sample and per condition is presented in Table 1. Further details regarding the characteristics of the study population can be found in our process evaluation (Komrij et al., 2026).

3.3. Parental questionnaire outcomes

3.3.1. Intervention effects on PAS-R total anxiety scores (primary outcome)

Fig. 2 visualizes the development of the observed total anxiety scores over the study period and Table 2 presents the estimated marginal means derived from the mixed models analyses. The raw means and standard deviations of the PAS-R scores can be found in Appendix C. A significant main effect of condition was observed ($b = -5.00$, $p = .017$), indicating that, after adjusting for baseline PAS-R total scores, child age, and sex, parents in the intervention condition reported significantly lower total anxiety scores than those in the control condition at T1. The pairwise simple-effects comparisons based on the estimated marginal means demonstrated significant group differences at T1 ($p_{holm} = .033$, $d = -.35$) and T2 ($p_{holm} = .029$, $d = -.46$) but not at T3 ($p_{holm} = .110$, $d = -.31$). The Time*Condition interaction terms were non-significant (T2*Condition: $b = -1.66$, $p = .405$; T3*Condition: $b = .45$; $p = .846$), indicating that the magnitude of these group differences was stable during the follow-up period. Thus, although the between-group difference in the total anxiety score at T3 was not statistically significant, the mixed model provided no evidence that the intervention effect at T3

Table 1
Characteristics of the study population at baseline.

	Total (N = 148)	Intervention (n = 75)	Control (n = 73)
Parents' characteristics			
Age, <i>M</i> (<i>SD</i>)	36.96 (4.33)	32.27 (4.08)	36.65 (4.58)
Questionnaire filled in by the child's mother, % (<i>n</i>)	88.4 (129)	90.5 (67)	86.1 (62)
Parental role of the parent's partner, % (<i>n</i>)			
No partner or partner is not a parent of the child	6.1 (9)	5.5 (4)	6.9 (5)
Partner is the child's other (biological) parent	93.8 (136)	94.5 (69)	93.1 (67)
Country of birth, % (<i>n</i>)			
Both parents born in the Netherlands	75.0 (111)	72.0 (54)	78.1 (57)
One of the parents not born in the Netherlands	20.3 (30)	21.3 (16)	19.2 (14)
Both parents not born in the Netherlands	4.7 (7)	6.7 (5)	2.7 (2)
Parental educational level, % (<i>n</i>)			
Low	0 (0)	0 (0)	0 (0)
Medium	6.3 (9)	4.2 (3)	8.5 (6)
High	93.7 (133)	95.8 (68)	91.5 (65)
Children's characteristics			
Age, <i>M</i> (<i>SD</i>)	4.58 (1.05)	4.48 (1.08)	4.67 (1.02)
Girls, % (<i>n</i>)	57.5 (84)	62.2 (46)	52.8 (38)
Born in the Netherlands, % (<i>n</i>)	93.2 (138)	91.9 (68)	97.3 (71)
Behavioral inhibition (BIQ-SF), <i>M</i> (<i>SD</i>)	63.77 (8.08)	64.87 (8.14)	62.63 (7.93)
Family characteristics			
Gross monthly household income, % (<i>n</i>)			
0 to 3000 euros	4.1 (6)	4.0 (3)	4.1 (3)
3000 to 6000 euros	27.7 (41)	26.7 (20)	28.8 (21)
6000 to 9000 euros	29.7 (44)	28.0 (21)	31.5 (23)
More than 9000 euros	23.6 (35)	25.3 (19)	21.9 (16)
Unknown	14.9 (22)	16.0 (12)	13.7 (10)
Other children in the household, % (<i>n</i>)			
No	19.2 (28)	16.2 (12)	22.2 (16)
Yes, one sibling	73.3 (107)	77.0 (57)	69.4 (50)
Yes, more than one sibling	7.5 (11)	6.8 (5)	8.4 (6)

Note. Educational level was based on the highest completed level of both child's parents: low = primary, prevocational secondary, lower and secondary (year < 4) education or lower vocational training; medium = upper secondary (year > 3) education or intermediate vocational training; high = university or applied sciences. For reference, national data from Statistics Netherlands indicate that in 2025 83.2% of the population was born in the Netherlands, of which 85.9% had two parents born in the Netherlands, 7.7% had one parent born abroad and 6.5% two parents born abroad; in 2024 36.4% of the Dutch population had a high, 37.0% an intermediate, and 26.0% a low educational level; in 2024 the average annual household income was €60,200 in (Statistics Netherlands, 2026).

differed in size from that observed in earlier follow-up assessments. Furthermore, child age and sex did not contribute to differences in anxiety symptoms (both $p > .850$). Finally, sensitivity analyses excluding participants (i) who reported that they had received additional support for their child during the study period (i.e., 7 participants within the intervention condition and 12 participants within the control condition), and (ii) whose child met criteria for any DIPA anxiety disorder classification at baseline (see Table 3) yielded results comparable to the initial analyses, with no meaningful differences in effect estimates and unchanged statistical significance.

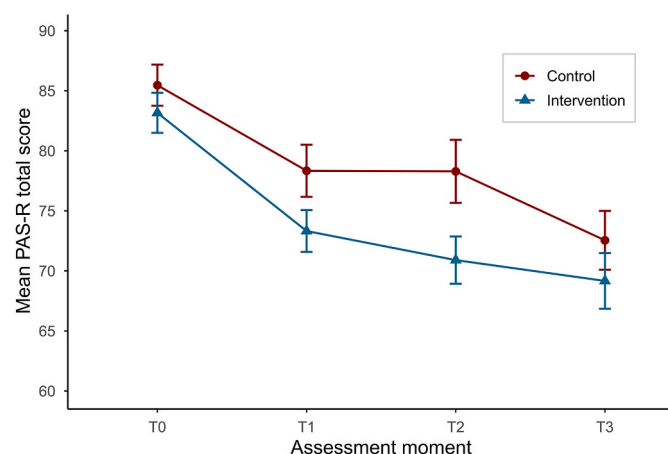


Fig. 2. Observed total anxiety scores over the study period by condition.
Note. Error bars denote standard errors.

3.3.2. Intervention effects on PAS-R anxiety subscale scores (secondary outcomes)

Analyses of the PAS-R subscale scores demonstrated that the intervention effects differed across anxiety domains. Significant main effects of condition were observed for specific phobias ($b = -1.70$, $p = .021$) and generalized anxiety ($b = -1.79$, $p = .012$), whereas no significant effects emerged for separation anxiety ($b = -.53$; $p = .316$) and social anxiety ($b = -.93$; $p = .167$). Across all subscale scores, the intervention and control condition showed comparable declines over the follow-up period, as reflected by non-significant Time*Condition interaction terms. The pairwise simple-effect tests indicated that, after correction for multiple testing, the group differences for separation anxiety, specific phobias, and social anxiety were not significant at any assessment moment. For generalized anxiety, significant group differences were present at T1 ($p_{holm} = .026$, $d = -.38$) and T2 ($p_{holm} = .026$, $d = -.45$), but not at T3 ($p_{holm} = .070$, $d = -.34$). Refer to Table 2 and Fig. 3 for a complete overview.

3.4. Diagnostic interview outcomes (secondary outcome)

As shown in Table 3, 16.3% of the children met criteria for at least one anxiety disorder classification based on the DIPA interview at baseline. At T1, these proportions decreased to 6.9% in the intervention condition and 7.1% in the control condition, and further to 3.4% and 7.5% at T3, respectively. As the proportion of children meeting an anxiety disorder classification at post-intervention and follow-up was too low to allow for meaningful analyses, no further analyses were conducted for these diagnostic outcomes.

Table 2

Estimated marginal means of the PAS-R scores at post-intervention and follow-up including results from the pairwise simple-effect tests.

	T1			T2			T3		
	EMM (95% CI)	<i>p</i> _{Holm}	Cohen's <i>d</i>	EMM (95% CI)	<i>p</i> _{Holm}	Cohen's <i>d</i>	EMM (95% CI)	<i>p</i> _{Holm}	Cohen's <i>d</i>
Total anxiety									
Intervention	73.29 (70.37 - 76.21)	.033	-.35	71.08 (67.57 - 74.58)	.029	-.46	68.91 (64.94 - 72.87)	.110	-.31
Control	78.29 (75.45 - 81.14)			77.74 (74.15 - 81.33)			73.46 (69.49 - 77.42)		
Separation anxiety									
Intervention	10.30 (9.55 - 11.04)	.631	-.14	9.58 (8.75 - 10.41)	.156	-.31	9.52 (8.66 - 10.38)	.646	-.07
Control	10.82 (10.10 - 11.54)			10.76 (9.91 - 11.62)			9.80 (8.95 - 10.66)		
Specific phobias									
Intervention	20.35 (19.32 - 21.38)	.062	-.29	20.16 (19.04 - 21.29)	.162	-.24	18.89 (17.61 - 20.17)	.285	-.16
Control	22.05 (21.05 - 23.06)			21.60 (20.45 - 22.75)			19.87 (18.59 - 21.14)		
Social anxiety									
Intervention	21.10 (20.16 - 22.05)	.208	-.17	20.33 (19.20 - 21.46)	.085	-.34	19.74 (18.45 - 21.04)	.208	-.29
Control	22.03 (21.11 - 22.96)			22.16 (20.99 - 23.33)			21.27 (19.96 - 22.57)		
Generalized anxiety									
Intervention	18.18 (17.17 - 19.18)	.026	-.38	17.59 (16.47 - 18.71)	.026	-.45	17.46 (16.21 - 18.72)	.069	-.34
Control	19.97 (18.99 - 20.94)			19.75 (18.60 - 20.89)			19.10 (17.85 - 20.36)		

Note. EMM = estimated marginal mean; CI = confidence interval; *p*_{Holm} = Holm adjusted *p*-value.

Table 3

Proportions of children meeting criteria for an anxiety disorder classification based on the DIPA across the study period.

	T0		T1		T3	
	Intervention	Control	Intervention	Control	Intervention	Control
Any anxiety disorder	16.2 (11)	16.4 (11)	6.9 (4)	7.1 (4)	3.4 (2)	7.5 (4)
Separation anxiety	12.7 (9)	14.5 (10)	1.6 (1)	5.1 (3)	1.7 (1)	3.6 (2)
Specific phobias	1.4 (1)	0 (0)	3.3 (2)	0 (0)	0 (0)	0 (0)
Social anxiety	5.6 (4)	1.5 (1)	1.6 (1)	3.5 (2)	1.7 (1)	3.6 (2)
Generalized anxiety	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Note. All values are reported as % (*n*). Sample sizes differ per diagnostic category and follow-up moment due to missing data, exact *n*'s are shown in the table.

4. Discussion

The current study investigated the effectiveness of the live, online CLK intervention on child anxiety. By evaluating this delivery format within a naturalistic setting, we aimed to assess the effects of an interactive, group-based, online parenting program when implemented in routine clinical practice, and to explore whether the results were comparable to those of previous traditional in-person programs. In agreement with our hypotheses, an intervention effect on total anxiety symptoms was observed. Across the follow-up period, group differences remained stable in favor of the intervention condition, although statistical significance was not reached at the twelve-month follow-up. Subscale analyses showed a comparable pattern for separation anxiety, specific phobias, social anxiety, and generalized anxiety. However, after adjusting for multiple testing, significant group differences were observed only for generalized anxiety at post-intervention and at six month follow-up.

The present findings demonstrate that the adapted CLK intervention is effective in the short to medium term, with clear effects maintained up to six months post-intervention. These results provide novel evidence that a live, online, group-based format is a promising alternative to in-person delivery. The intervention equipped parents with tools that effectively reduced anxiety symptoms in their young, anxiety-prone children. The results extend the evidence established by the previous Australian trial examining the onsite delivery of the CLK intervention, which similarly observed positive effects on symptom-level measures (Bayer et al., 2018, 2021). Importantly, the effect sizes observed in the present study ($d = -.31$ to $d = -.46$) are in line with those reported in previous meta-analyses of targeted preventive interventions for anxiety problems ($d = -.23$ to $d = -1.13$; Rienks et al., 2025; Yap et al., 2016) and comparable to the overall effect size reported in the meta-analysis by Ooi et al. (2022) on interventions for inhibited preschool-aged children (Standardized Mean Change = $-.47$). This suggests that the live,

online, group-based format can yield outcomes that are generally consistent with those of traditional in-person delivery, supporting its potential for routine clinical practice.

Notably, the effects were no longer statistically significant at the twelve month follow-up, a pattern also observed in the long-term follow-up of the Australian translational trial (Bayer et al., 2022). Importantly, however, the effect size at the twelve month follow-up ($d = -.31$) remained comparable to that observed at post-intervention ($d = -.35$), demonstrating enduring improvements in the intervention condition. Such modest effect sizes are common for preventive interventions and may still yield meaningful population-level benefits (Carey et al., 2023; Fisak et al., 2011; Werner-Seidler et al., 2017). Therefore, the loss of statistical significance does not necessarily imply a lack of clinical relevance. Adding to this, parents in the control condition sought additional psychological support nearly twice as often as those in the intervention condition (see section 3.3.1). This difference should be interpreted with caution, given the small absolute numbers and the possibility that families were dissatisfied with being randomized to a book. Nonetheless, it may also suggest greater ongoing need for support among control condition families.

While it is possible that preventive effects of interventions naturally attenuate over time, several reasons might explain the absence of long-term significance. As noted by Cuijpers (2003), preventive trials require large sample sizes to detect statistically significant effects at longer follow-up moments, due to natural symptom fluctuations. This may have complicated the detection of long-term intervention effects. Furthermore, although our study met its intended sample size, our sample included children with lower levels of anxiety-related impairment than those included in previous trials informing our power calculation (Kennedy et al., 2009; Ooi et al., 2022). As more clinical samples typically allow for larger effect sizes, our study might have been underpowered to detect smaller intervention effects, particularly at longer-term follow-up. An additional methodological consideration is

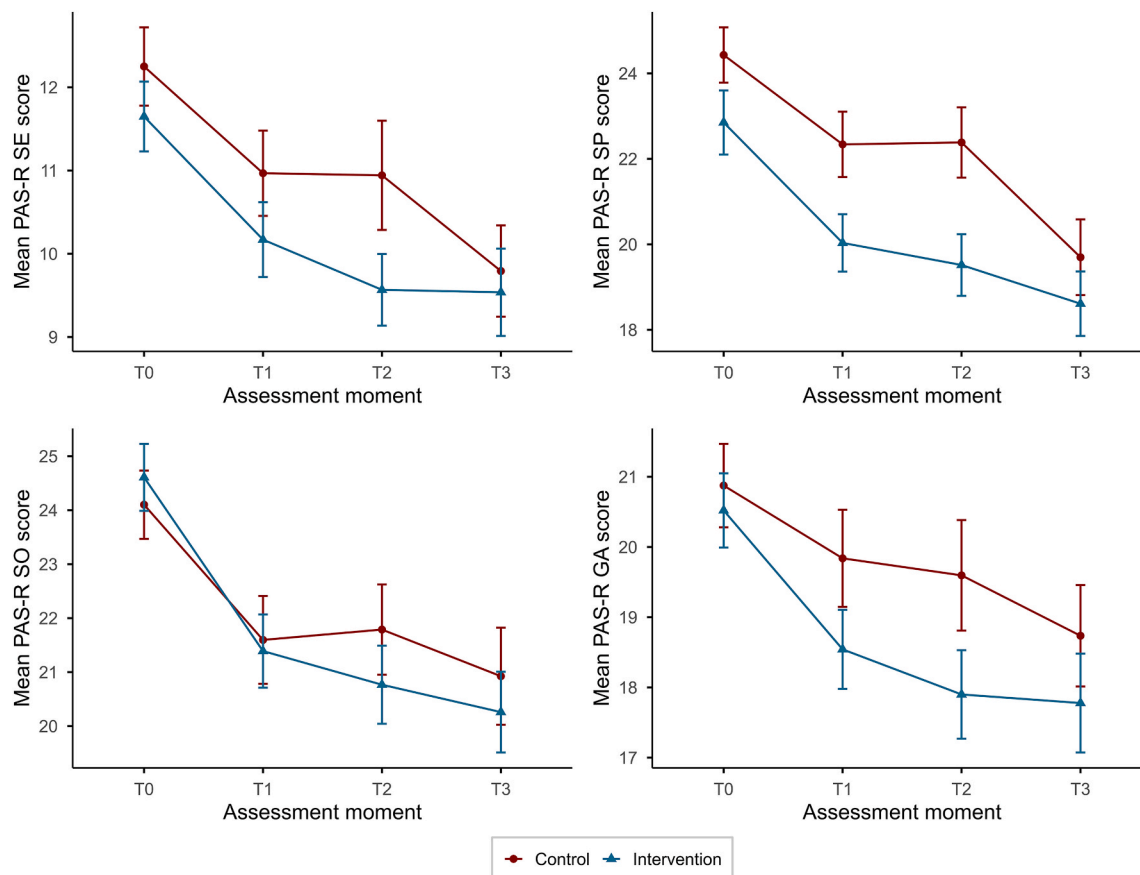


Fig. 3. Observed anxiety subscale scores over the study period by condition.

Note. Error bars denote standard errors.

SE = separation anxiety; SP = specific phobias; SO = social anxiety; GA = generalized anxiety.

that the materials provided to the control group may have offered more benefits than initially anticipated. Providing parenting materials to the control group was a deliberate ethical choice, as withholding support from families identified as being at risk was considered inappropriate. Although the book was not specifically tailored to anxiety, these broader strategies combined with parents' awareness of their child's elevated risk of developing anxiety problems may have been sufficient to support families with milder symptoms. Accordingly, parents in the control condition also reported declines in anxiety symptoms and were generally satisfied with the book, potentially reducing the observed between-group differences compared to what would be expected with a no-intervention or waitlist control group. However, this finding also suggests that families differ in the type and intensity of support they require, particularly in contexts where symptom severity is highly heterogeneous. Stepped or matched care approaches, which tailor the intensity of support to individual needs, are designed to accommodate such variation and may contribute to a more efficient use of preventive resources (Ollendick et al., 2018). These approaches have been examined in the context of anxiety treatment, where positive effects have been reported (Ho et al., 2016). Exploring stepped or matched care approaches within anxiety prevention in early childhood may therefore represent an important next step in optimizing preventive strategies, particularly by identifying which type and intensity best suits the specific needs of diverse family profiles.

The findings of the current study should be considered in light of several strengths and limitations. A primary strength is the RCT design, including the use of an a priori power calculation. The inclusion of multiple assessment moments, together with the relatively low attrition rates, ensured a robust and reliable foundation for evaluating the

intervention's effectiveness. However, as discussed above, the anticipated effect size was likely overestimated for the present sample. The study may therefore have been underpowered to detect smaller intervention effects. Another strength is that the study was conducted under real-world circumstances with close collaboration with local public and mental health organizations for participant recruitment and intervention delivery, highlighting the relevance of the results for preventive practice and policy. Within this context, eligibility was assessed using a structured telephone intake. This approach led to some discrepancy between initial eligibility assessment and baseline diagnostic interview outcomes, as 16.3% of children met criteria for a DIPA anxiety disorder classification at baseline, despite exclusion criteria specifying the children whose anxiety symptoms already cause significant interference with daily functioning. Yet, since this procedure aligns with routine screening practices, it enhances the study's ecological validity. Importantly, the sensitivity analysis yielded comparable results, demonstrating that the intervention's effectiveness was robust across this heterogeneity of anxiety symptoms, supporting its suitability for further implementation in real-world settings.

Limitations include the relatively homogenous study population, consisting predominantly of highly educated parents who were born in the Netherlands. This limits the generalizability of the results to more diverse populations. Another limitation includes the reliance on parent-report measures, which may be subject to informant bias as parents were not blinded to condition. While we also collected more objective clinical interview data, the prevalence of children meeting the criteria for an anxiety disorder classification was too low to allow for meaningful statistical analyses. This emphasizes the challenges of evaluating preventive effects in early childhood, as clinical disorders often only fully

manifest in middle childhood or adolescence. Consequently, longer follow-up periods are crucial to investigating the intervention's potential to prevent the onset of formal clinical diagnoses (Rapee, 2013). Finally, it should be noted that the present manuscript provides a focused evaluation of the intervention's effects on child anxiety. Although this distal outcome indicates whether the intervention's overarching goal was achieved, the intermediate processes through which the intervention may exert its long-term effects (e.g., changes in parenting behaviors or parental functioning) are not yet examined. In addition, other potential secondary effects of the intervention and its societal and economic impact have also not yet been considered. Forthcoming analyses of the broader trial data will complement the present findings by addressing these other predefined research questions. Furthermore, future research should incorporate assessments at earlier stages of the intervention to better capture the initial changes in children's and parents' behaviors. This would enable a more sensitive assessment of the intervention's impact and a more comprehensive understanding of its preventive effects (Lebowitz et al., 2016; Luo & McAloon, 2021).

In conclusion, the present study demonstrated that a live, online, group-based parenting intervention can effectively reduce anxiety symptoms in anxiety-prone young children. While the use of an active control condition and the natural decline of anxiety symptoms in some children likely resulted in a conservative estimate of the intervention's impact, the consistent trend favoring the intervention highlights its preventive potential.

Availability of data and materials

The data supporting the current study are stored in DataverseNL and are available upon reasonable request from the corresponding author or via <https://doi.org/10.34894/RKXERS>.

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CRediT authorship contribution statement

Nina L. Komrij: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Visualization, Writing – original draft, Writing – review & editing. **Frederike Y. Scheper:** Conceptualization, Funding acquisition, Methodology, Writing – review & editing. **Mia P. Kusters:** Conceptualization, Funding acquisition, Methodology, Writing – review & editing. **P. Michiel Westenberg:** Conceptualization, Methodology, Writing – review & editing. **Leonie J. Vreeke:** Conceptualization, Funding acquisition, Methodology, Project administration, Supervision, Writing – review & editing.

Declaration of competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.brat.2026.105139>.

Data availability

Data will be made available on request.

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