

## **Maternal Anxiety: A Systematic Literature Review on Effects and Interventions for Early Childhood Outcomes**

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### **Abstract**

**Background:** High maternal anxiety, a public health concern, is associated with developmental delays (including slowed neurological development) as well as increased behavioural problems.

**Objective:** This research aims to identify the impact of maternal anxiety on child health and development, whether social support acts as a buffering factor (i.e., protective effect), and what types of interventions have demonstrated efficacy in reducing maternal anxiety.

**Methodology:** In accordance with the PRISMA guidelines, we conducted a systematic literature review by searching databases including ScienceDirect, PubMed, Taylor & Francis, and Springer. Following rigorous screening and selection, 73 studies were included for analysis, providing a robust foundation for examining the impact of maternal anxiety and the outcomes of various interventions.

**Results:** Interventions such as Cognitive Behavioural Therapy (CBT), counselling, and prenatal education were shown to reduce anxiety levels among mothers. Moreover, support networks within communities and accessible mental health services were found to benefit maternal mental health, particularly in deprived areas.

**Unique Contribution:** This review highlights gaps in knowledge regarding maternal anxiety, including the need for studies that examine the interplay between anxiety and low social support, as well as insufficient emphasis on the efficacy of interventions, especially among socio-economically disadvantaged populations and those in rural settings.

**Conclusion:** An integrated approach to maternal mental health should include routine screening for maternal anxiety as part of public health initiatives, affordable access to CBT,

and targeted prenatal education during pregnancy. Community-initiated networks tailored around social support practices could further enhance both maternal mental health and child development outcomes.

**Key Recommendation:** Policymakers and healthcare practitioners should facilitate access to mental health services and expand community-based programmes that provide vital practical and emotional support for mothers, especially those underserved or living in rural areas.

**Keywords:** maternal anxiety, mental health, interventions, cognitive behavioural therapy, prenatal education

## Introduction

Maternal anxiety impacts child development, influencing physical, cognitive, and emotional growth both directly and indirectly (Ghahyazi et al., 2023). Its effects can begin as early as pregnancy, affecting brain development and delaying cognitive and social skills (Kabir et al., 2024). Elevated cortisol levels in anxious mothers can cross the placenta, impairing foetal growth and brain structuring (Brandes-Aitken et al., 2024). Longitudinal studies have shown that children of anxious mothers exhibit more anxious or aggressive behaviours (Schwarze et al., 2024). Thus, maternal anxiety is a high-risk factor for early childhood development, requiring public health attention (Stevenson-Hinde et al., 2013).

Some effective interventions include Cognitive Behavioural Therapy (CBT) to reduce maternal anxiety and counselling during pregnancy, which contributes positively towards a child's mental health. The benefits of prenatal education programmes result in reduced levels of maternal anxiety, promoting maternal mental well-being and optimal child development (Kabir et al., 2024). Research has shown that CBT and counselling lessen anxiety in pregnant women (Marom et al., 2024). Prenatal education focusing on stress management and parenting skills is essential for improving a mother's mental readiness and reducing anxiety during pregnancy (Stevenson-Hinde et al., 2013). CBT is a well-established form of psychotherapy that teaches mothers more effective ways to cope with stress and emotions, as well as providing a better understanding of pregnancy and parenting. This, in turn, creates a better environment for the developing foetus (Marom et al., 2024). CBT has strong empirical support as an intervention for anxiety, as it helps identify and change negative thought patterns (Tran et al., 2024). Providing prenatal education has been suggested as a protective factor against maternal anxiety by reducing uncertainty and building confidence (Noroña-Zhou et al., 2023). Based on these findings, additional systematic reviews are needed to investigate potential effectiveness by intervention type in different contexts, ensuring approaches are adapted for target populations.

However, previous studies have not considered how maternal interventions affect how social support influences intervention effectiveness. Social support is regarded in the literature as a protective factor, but what this entails and the mechanisms underlying this protection have not yet been subjects of detailed inquiry. For example, support from a friend appears to be as effective in helping mothers requiring caesarean deliveries as other forms of available social help, such as teams of medical experts or even blanket coverage by television cameras (DeVries et al., 2023). To address this gap, further research is necessary to examine these variables and compare the effectiveness of interventions across different maternal profiles.

## The Objective of The Study

Furthermore, we explore effective interventions to prevent or reduce the negative consequences of maternal and child interventions occurring in adulthood. Treating anxious expectant mothers with cognitive behavioural therapy or providing detailed prenatal preparation classes has been shown in research to reduce maternal anxiety. The effects of maternal anxiety on child health and development need to be scrutinised using rigorous methods.

## Methods

### Review Method

The literature on maternal anxiety was reviewed in a structured manner to identify its effects on child health and development. This included examining how social support plays a protective role and assessing the evidence for various interventions introduced in recent years. The Systematic Literature Review (SLR) method was followed, ensuring that the findings presented were consistent with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines.

### Data Source

The primary data sources were obtained from various credible and internationally recognised scientific databases. The list of data sources is presented in Table 1.

**Table 1. Data Base in Literature Tracking**

No	Database	Weblink
1	Sciencedirect	<a href="https://www.sciencedirect.com/">https://www.sciencedirect.com/</a>
2	Pubmed	<a href="https://pubmed.ncbi.nlm.nih.gov/">https://pubmed.ncbi.nlm.nih.gov/</a>
3	Taylor and Francis	<a href="https://www.tandfonline.com/">https://www.tandfonline.com/</a>
4	Springer	<a href="https://link.springer.com/">https://link.springer.com/</a>

Each database brought its own unique strengths, encompassing high-quality journals from a range of relevant fields, including health, psychology, and sociology, all of which are essential for understanding the multifaceted nature of anxiety in pregnant women.

### Literature Search Strategy

The strategy employed to search for articles reviewing the literature on maternal anxiety and its effects on child health and development involved the use of a range of keywords and terms that covered both direct and indirect aspects of maternal anxiety. Key terms such as "*maternal anxiety*", "*child health*", and "*child development*" were central to identifying literature specifically examining the impact of maternal anxiety on child health. To expand the breadth of the search, additional terms were incorporated, including variations such as "*prenatal anxiety*", "*parental stress*", and "*infant emotion*", which facilitated the discovery of studies using different terminology to describe anxiety during pregnancy or early childhood. Furthermore, related terms such as "*maternal depression*" and "*behaviour*" were included to capture research exploring emotional and behavioural aspects within the context of maternal mental health. The terms "*maternal health*" and "*mindfulness*" were also considered to encompass literature on general maternal health conditions as well as psychological approaches contributing to managing maternal anxiety. Examples of strings used in the literature search are presented below:

*“Maternal” AND “Anxiety” OR “Stress” OR “Emotion” OR “depression” OR “Mental Health”*

### **Inclusion and Exclusion Criteria**

Inclusion and exclusion criteria were applied to determine the relevance and quality of the studies to be analyzed. The inclusion and exclusion criteria are presented in Table 2.

**Table 2. Inclusion and Exclusion Criteria**

<b>Criteria</b>	<b>Inclusion</b>	<b>Exclusion</b>
Participants	<ul style="list-style-type: none"> <li>• Pregnant women or mothers of young children (0-5 years old).</li> <li>• Studies involving mothers with objectively measured experiences of maternal anxiety.</li> </ul>	Studies that do not focus on pregnant women or the postnatal period
Context	<ul style="list-style-type: none"> <li>• Studies conducted in a variety of settings, including hospitals, health clinics, communities, or through online surveys.</li> <li>• Studies that included populations from different social, economic and cultural backgrounds.</li> </ul>	<ul style="list-style-type: none"> <li>• Studies conducted on non-human populations or pre-clinical research (for example, animal studies).</li> <li>• Studies that address child health and development without mentioning the effects of maternal anxiety.</li> <li>• Studies that focused on other factors, such as generalized anxiety or other psychological disorders, without specifically examining maternal anxiety.</li> </ul>
Publication Time	Articles published within the last 10 years to ensure relevance and novelty of information.	Articles that were too old and did not provide context or recommendations relevant to current practice or health situations.
Language	Studies published in English	Articles that are not in English

### **Bias Reduction and Validation of Findings**

Attempts were made to minimise bias during the data extraction and analysis process: (1) the use of clear and detailed inclusion and exclusion criteria ensured that only relevant and high-quality studies were included in the analysis, and (2) the data extraction process was conducted by more than one researcher independently so that each researcher could verify and compare the extraction results, as well as discuss any differences that arose to reach consensus. Therefore, efforts to minimise bias helped create more valid and reliable results and enhanced the quality of the literature review.

### **Results**

#### **Description of Selected Studies**

Our screening and selection of the studies to be used in research on maternal anxiety were meticulous. In these health-related electronic resources or databases, the immediate search produced a result of 11,235 articles. Figure 1 shows the screening of articles. The production of each article was strictly vetted through key stages that included identification by name or number, screening according to specific inclusion and exclusion criteria (incorporating a wide range of data sources), and evaluation of this list (Page et al., 2021). In total, 73 articles were

chosen for detailed examination, covering the latest high-quality studies that helped deepen our knowledge of what causes or aggravates maternal anxiety and how we might intervene.

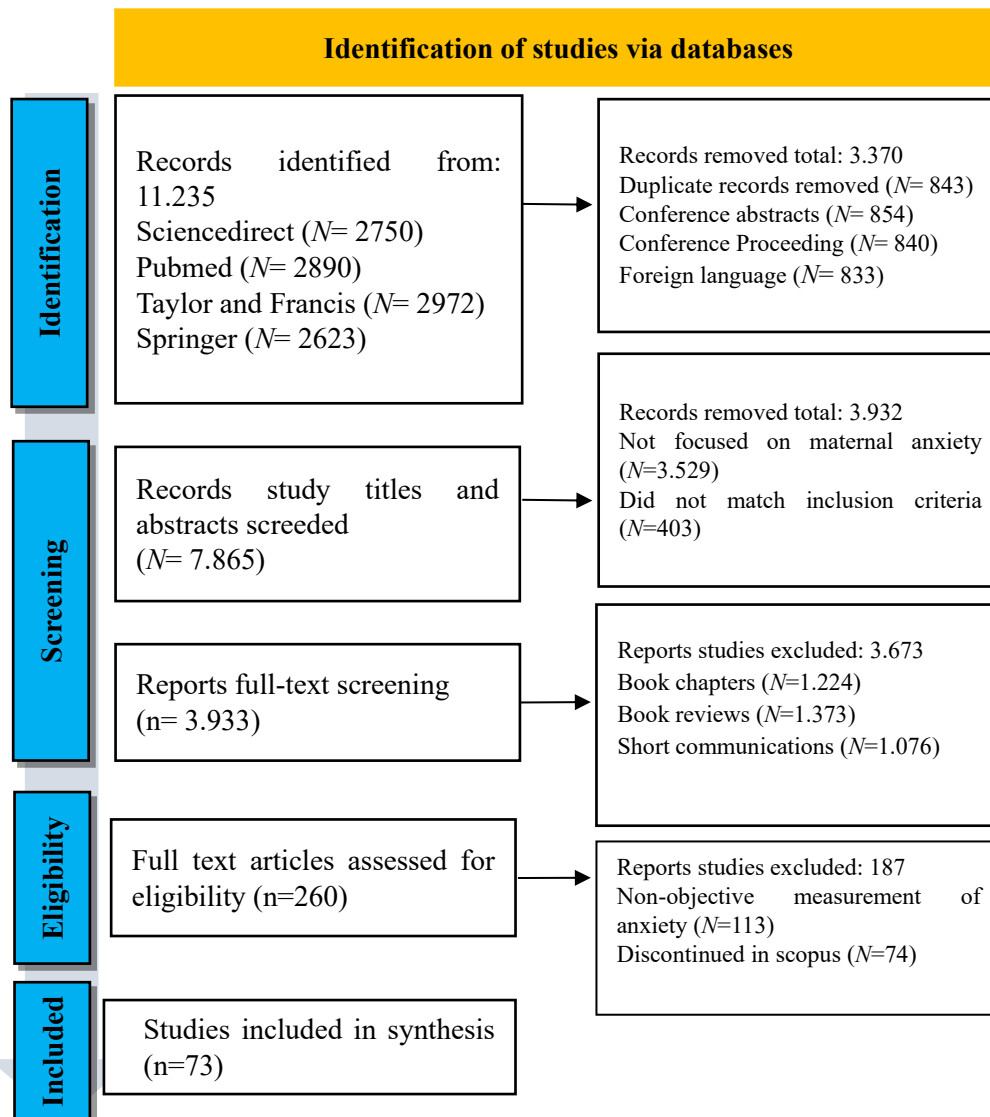


Figure 1. PRISMA flow diagram illustrating the identification and screening process (Page et al., 2021).

The selected studies' descriptions included an identification process that considered the quality and credibility of the sources based on specific criteria: Journal Publication, SCImago Journal Rank (SJR) 2023, Q Category, and Publisher. The characteristics of the reviewed articles are presented in Table 3, which constitutes the top 10. Table 3 presents scientific publications on maternal anxiety spread across various highly reputable journals, most of which are in the Q1 category based on the SCImago Journal Rank (SJR) in 2023. The number of studies published in 2024 reached a high (N=29), illustrating the increasing attention and urgency among academics and practitioners. An upward trend began in 2023 with 25 publications, marking an increase compared to previous years, which ranged from only 1 to 8 studies per year. The significant rise in the number of publications after 2020 reflected a shift in research focus, encouraging greater attention to the issue of maternal anxiety.

**Table 3. Top Ten Characteristics of Maternal Anxiety Scientific Publications**

No	Journal Publication	<i>N</i>	SCImago Journal Rank (2023)	Q Category	Publisher
1	Journal of Affective Disorders	7	2.08	Q1	Elsevier B.V.
2	Archives of Women's Mental Health	4	1.44	Q1	Springer-Verlag Wien
3	Maternal and Child Health Journal	4	0.83	Q1	Springer New York
4	Research on Child and Adolescent Psychopathology	4	1.31	Q1	Springer New York
5	Archives of Gynecology and Obstetrics	3	0.78	Q2	Springer Verlag
6	BMC Pregnancy and Childbirth	3	1.06	Q1	BioMed Central Ltd
7	BMC Psychiatry	3	1.3	Q1	BioMed Central Ltd
8	Infant Behavior and Development	2	0.81	Q2	Elsevier Ltd
9	Journal of Child and Family Studies	2	0.81	Q2	Springer New York
10	Journal of Reproductive and Infant Psychology	2	0.82	Q1	Routledge

### **Intervention Types to Reduce Maternal Anxiety**

The results of the literature search on the types of interventions to reduce maternal anxiety are presented in Table 4. Research on interventions to reduce maternal anxiety reveals a range of approaches with varying effectiveness. Psychological approaches to postnatal anxiety, such as Heart Rate Variability biofeedback, have been found to be more successful than a placebo, which also suggests that Cognitive Behavioural Therapy is likely to be effective. Emotional support during another major life event, such as partner presence during labour, is already known to improve coping skills among women who go on to have mental health problems later in life. Skin-on-skin contact is also thought to improve both maternal and neonatal mental health. For instance, a technique like telemedicine, which uses electronic information technology to enable medical professionals in areas without specialists (such as rural regions) to consult on cases via phone or video, has shown some success. An interesting feature of this technology-based therapy is that it reduces anxiety by allowing patients to watch themselves on tape undergoing intrusive procedures like amniocentesis and then watch the last few minutes played back in slow motion for close study and discussion. Even in this age of information overload, some simple devices like music and virtual reality tapes have shown good results. In addition, a few treatments brought no significant effects, such as myo-inositol supplementation during the third trimester of pregnancy and music playback. On the other hand, programmes combining long-term psychotherapy, psychoeducation, and other methods lead to reduced levels of maternal anxiety (see Table 4). However, their success is highly influenced by external factors such as stress and personality disorders.

**Table 4. Variety of Interventions to Reduce Maternal Anxiety**

Primary Study	Methods	Sample	Intervention tested	Main findings
(Chen et al., 2024)	Randomized controlled trial	86 pregnant women	Heart rate variability (HRV)	HRVB training effectively reduced anxiety in mothers on the fifth postpartum day after a cesarean section compared to the control group.
(DeVries et al., 2023)	Multi-site study	87 pregnant women	Cognitive Behavioral Therapy (CBT)	Maternal anxiety impacts treatment outcomes in children with ASD and comorbid anxiety, particularly affecting younger children.
(Erkun Dolker & Basar, 2019)	Non-randomized controlled trial design	2353 pregnant women	Turkish folk music or classical music for 20 min	Music played during the third trimester did not affect maternal anxiety levels.
(El-Heis et al., 2024)	Randomized controlled trial	630 pregnant women	Myo-inositol, probiotics, and enriched micronutrients (intervention) versus standard micronutrients (control). Skin-to-skin contact at birth impacts maternal anxiety, satisfaction, and neonatal physiology.	Myoinositol, probiotics, and micronutrient supplementation showed no significant effect on mood and anxiety during pregnancy but slightly improved postpartum mental health scores.
(Kabir et al., 2024)	Randomized controlled trial	92 pregnant women	Interactions reducing maternal intrusive behaviors and interventions addressing anxiety symptoms.	Social support, such as the presence of friends, contributed positively to maternal mental health after delivery.
(Klauser et al., 2023)	Longitudinal study	70 pregnant women	Twice-weekly home ultrasound sessions, supplemented by telemedicine visits.	Intrusive maternal interactions and physical experiences associated with maternal anxiety negatively affect infant attachment.
(Mor et al., 2024)	Randomized controlled trial	100 pregnant women	Screening of a pre-procedure information video to the group undergoing amniocentesis.	Integration of telemedicine visits with home ultrasounds significantly reduces maternal anxiety during pregnancy and improves maternal attachment.
(Marom et al., 2024)	Randomized controlled trial	110 pregnant women	The experimental group received 150 mg pregabalin, while the	Screening an informational video before amniocentesis can help reduce the anxiety and mental health of pregnant women.
(Abdel Naby et al., 2021)	Randomized-controlled clinical study	74 pregnant women		Oral doses of pregabalin are effective in reducing maternal anxiety before cesarean section without causing significant side effects, and neonatal outcomes are good.

<b>Primary Study</b>	<b>Methods</b>	<b>Sample</b>	<b>Intervention tested</b>	<b>Main findings</b>
			control group received multivitamins.	
(Nacar et al., 2024)	Randomized-controlled clinical trial	120 pregnant women	Abdominal touch, Music, and Virtual reality video	Music and virtual reality video positively reduced maternal anxiety, while abdominal touch and virtual reality video were more effective in increasing fetal heart rate.
(O'Mahen et al., 2022)	Randomized controlled trial	114 pregnant women	Psychological therapy focused on anxiety, problem-solving, and mindfulness.	Pregnant individuals and their partners positively received the ACORN intervention, which reduced anxiety compared to usual care.
(Tran et al., 2024)	Longitudinal study	1125 pregnant women	Residential early parenting psychoeducational program	A residential psychological education program reduced maternal anxiety, but personality disorders and stressful events may affect the outcome.
(Zhang et al., 2021)	Cross-sectional study	769 pregnant women	Psychotherapy, community support, and family training for parents with perinatal depression.	Maternal depression during pregnancy, such as “sadness or feeling hopeless”, can affect the mental health of pregnant women



## Discussion

Maternal anxiety negatively affects the mental health and development of children in the long term. Studies by DeVries et al. (2023) and Noroña-Zhou et al. (2023) show that higher maternal anxiety increases the risk of anxiety and depression in children. Evidence also indicates the effects on child mental health and highlights the role of maternal anxiety during pregnancy and postpartum (Ingeborgrud et al., 2024). Given the variable prevalence of maternal anxiety, Klauser et al. (2023) argue that individual factors may be involved in the outcome. Complementing this, external factors, such as health problems during pregnancy, have also been shown to escalate maternal anxiety (Keenan et al., 2024), suggesting the broader aspects of the context necessary for a more complete understanding. These findings confirm that the effects of maternal anxiety are not just temporary but can influence children's self-regulation in the long term (Schwarze et al., 2024).

The impact of maternal anxiety is not only limited to psychological aspects but also extends to the physical health of the child, increasing the risk of long-term health problems. Maternal anxiety increases a child's risk of developing physical disorders such as obesity, hypertension, and cognitive impairment in the future. Studies by Ingeborgrud et al. (2024); Li (2023), and Sandre et al. (2022) showed a correlation between maternal anxiety and the increased prevalence of obesity, high blood pressure, and cognitive developmental problems in children. Zhou et al. (2024) confirmed that children of mothers who experienced anxiety during pregnancy are more likely to develop allergies, suggesting that maternal psychological aspects influence the child's physical health through certain physiological mechanisms (Stevenson-Hinde et al., 2013). However, some children do not develop physical disorders despite their mothers having high levels of anxiety, possibly due to protective factors such as a supportive environment and good postnatal care. Thus, although maternal anxiety is a significant risk factor, its impact on children's physical health may be modulated by environmental conditions and the care children receive after birth (Sandre et al., 2022).

Maternal anxiety is often linked to a decrease in a mother's sensitivity to her child's emotional needs, and it has negative impacts on both mothers and children. Erkun Dolker and Basar (2019) show an unsettling pattern: mothers with high anxiety levels often fail to respond to their children's emotional needs consistently. El-Heis et al. (2024) further illustrate the same issue from another angle; maternal anxiety and depression adversely affect a mother's ability to respond positively to her infant's sight and sound-sensory cues, resulting in a gradual decline in mother-infant interaction quality over time. Thus, stress's role in child development must be recognised (Klauser et al., 2023). Nacar et al. (2024) show that a mother's anxiety can lower her ability to empathise, which is an important ingredient for forming healthy emotional connections, and it also demonstrates how essential maternal emotional stability is for fostering healthy attachments.

Chen et al. (2024) found that Heart Rate Variability Biofeedback (HRVB) training significantly reduced anxiety on the fifth day postpartum. Similarly, Mor et al. (2024) demonstrated that combining telemedicine appointments with home ultrasounds helped to lower maternal anxiety and strengthen maternal attachment. O'Mahen et al. (2022) proved in their study that ACORN effectively reduces anxiety in participants. Moreover, Abdel Naby et al. (2021) found that oral pregabalin helps reduce preoperative nervousness before a caesarean section with no undesirable side effects; mental stress is one of many problems amenable to pharmacological interventions. However, not all interventions consistently produce results. For example, Reesor-Oyer et al. (2023) found that co-parenting support did not significantly moderate the

relationship between food insecurity and maternal depression and anxiety, suggesting that some scenarios may require additional or alternative help.

### **Limitations of the Study**

The limitations of this literature review primarily arise from the varying effectiveness of interventions in addressing maternal anxiety, with results differing based on individual characteristics and social contexts. Certain studies indicated that factors such as co-parenting support, economic status, and the availability of social support did not consistently or significantly alleviate maternal anxiety or depression. Moreover, many of the studies reviewed relied on homogeneous sample groups, which may not adequately represent the diversity of the broader population, thereby limiting the generalisability of the findings. Consequently, further research is required to investigate factors that moderate intervention effectiveness more comprehensively, incorporating personalised approaches tailored to individual needs within a more diverse maternal population.

### **Implication of Research Results**

Research on maternal anxiety and its influencing factors suggests that public health programmes could incorporate these findings into assistance initiatives for pregnant and postpartum women. Several policy recommendations that could be implemented to strengthen social support and improve access to mental health services, particularly for mothers in underserved neighbourhoods, include: (1) The provision of affordable and accessible mental health services by offering counselling and mental health support at primary clinics, such as “*Puskesmas*” or other community service centres, staffed with professionals knowledgeable in perinatal and postnatal conditions; (2) Community-based social support programmes that offer emotional support, education, and training in mentally supportive parenting skills; (3) Recognising the impact of cultural differences and social norms on maternal anxiety, public health programmes could provide parenting training that emphasises the importance of non-violent approaches while addressing cultural uniqueness in parenting practices; (4) Given the importance of early detection, health centres or hospitals could conduct standardised screening for maternal anxiety during pregnancy and immediately after childbirth.

### **Conclusion and Recommendations**

In conclusion, the study demonstrates that maternal anxiety has significant repercussions on both the mental well-being and the emotional and behavioural development of children. Anxiety experienced by mothers, both during pregnancy and after childbirth, increases the likelihood of mental health issues in children, such as anxiety and depression. These findings highlight the critical importance of emotional and social support for expectant mothers, alongside targeted interventions to alleviate maternal anxiety. From a clinical perspective, the study advocates for healthcare professionals to screen for maternal anxiety and implement integrated support systems routinely. Furthermore, a more comprehensive, community-driven approach is required to strengthen social support networks for mothers, particularly in underserved areas. Ultimately, interventions aimed at reducing maternal anxiety not only improve the mother's health but also promote the child's long-term development.

### **Conflict of interest**

The authors hereby declare that no conflict of interest exists

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