

Prevention of early breastfeeding-related pain or complications by antenatal education on Biological Nurturing through film: A real-life parallel quasi-randomized controlled trial embedded in the German BALANCE cohort study

Abstract

Introduction

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Background: Despite growing recognition of its importance, effective breastfeeding support remains limited worldwide. A meta-analysis on the effectiveness of Biological Nurturing or the laid-back position revealed its efficacy to prevent early breast problems.

Aim: To elicit whether a film on Biological Nurturing (intervention), compared to a film on traditional breastfeeding positions (control), watched during pregnancy, reduced breast problems and increased the exclusivity of breastfeeding at initiation stage.

Methods: A real-life parallel quasi-randomized controlled trial embedded in a prospective cohort was conducted, using an online survey administered through REDCap software with alternating group allocation. Survey items were both quantitative and qualitative, with data collected at TR (registration), T0 (birth to 21 days) and T1 (22-42 days). SPSS 31.0 was used to calculate Chi square, Mann-Whitney-U-test, median and frequencies. Google Gemini was used as an assistive tool for preliminary categorization and translation support of qualitative data, while final coding, interpretation and validation were performed by the research team. Primary outcomes were breast problems and exclusive breastfeeding at 3 weeks postpartum.

Results: 380 participants provided data for the study. The intervention group showed a lower incidence of any breastfeeding-related problems at 3 weeks postpartum, measured at T0

($p=0.002$) and T1 ($p=0.03$). However, there was no significant difference in exclusive breastfeeding at 3 weeks postpartum ($p>0.1$).

Conclusion: While this study contributes to growing evidence on Biological Nurturing reducing early breast problems and the effectiveness of antenatal education, its lack of effect on early exclusive breastfeeding highlights the ongoing need for skilled breastfeeding support.

Keywords

breast pain, breastfeeding support, exclusive breastfeeding, health services research, postpartum care, Randomized Controlled Trials, Biological Nurturing, antenatal education, online, breastfeeding initiation

Introduction

The protection, promotion and support of breastfeeding is a key public health intervention with short-, medium- and long-term public health benefits (Renfrew, 2016; Rollins et al., 2016; Victora et al., 2016). One major problem and reason for early unintended breastfeeding discontinuation is breast pathology, including pain and complications of the nipple or the breast at breastfeeding initiation stage (Gavine et al., 2022; Li et al., 2008; Niazi et al., 2018). Therefore, breastfeeding guidance and support need to be improved in the pivotal time window of breastfeeding initiation (de Oliveira et al., 2006; Gray et al., 2022; WHO & UNICEF, 2003; Zakarija-Grković et al., 2020).

Biological Nurturing (BN) is a neurobehavioral approach to facilitate breastfeeding. The main components are maternal comfort, including leaning in a semi-reclined position, and

ventral positioning of the baby on the mother's body with full body support (Colson, 2005). Baby makes use of approximately 20 innate neonatal reflexes to find the breast, while the mother intuitively supports the baby by following her maternal instincts (Colson et al., 2008).

A meta-analysis of BN interventions (Wang et al., 2021), found that BN can facilitate breastfeeding initiation by significantly reducing breast problems in the early postpartum stage, with nipple pain and nipple trauma identified as common major problems. BN could therefore be considered a best practice approach for the prevention of early nipple pain and trauma, and helping to address one of the major reasons why mothers discontinue breastfeeding early and unintentionally (Kent et al., 2015).

An Italian real-life RCT undertaken by Milinco et al. has found that watching a film on BN during pregnancy and being supported on maternity ward by a qualified IBCLC and trained healthcare staff significantly reduced early complications such as breast problems, cracked and sore nipples (Milinco et al., 2020). This study used the educational film "Biological Nurturing – laid-back breastfeeding for mothers" by Suzanne Colson et al from 2011 for the intervention group during pregnancy. This film demonstrates BN positions of mothers and babies, explaining their advantages to mothers in an easily understandable way. Mothers in the control group watched "Breast is best" by Gro Nylander from Norway (2016), which did not show any BN position, but rather traditional positions such as cradle, cross-cradle, football and side-lying positions.

We aimed to elicit whether exposure to the BN film alone shown during pregnancy could support breastfeeding initiation by reducing breastfeeding-related problems. Our RCT compared the effect of the 2011 BN film on early breastfeeding outcomes and breastfeeding

exclusivity up to 3 weeks postpartum. The control group viewed a film demonstrating traditional breastfeeding positions. This real-life parallel Quasi-Randomized Controlled Trial (RCT) was conducted in Germany from 12 May 2023 until 31 January 2025, as part of a larger cohort study that remains ongoing in 2026.

Study design

Survey development

The cohort, in which the RCT is embedded, is called BALANCE: **B**reastfeeding **A**dvisory **L**inked **A**ssessment: **N**eeds, **C**ounseling, and **E**xpectations and includes qualitative and quantitative items at the ratio 1:3 on a variety of breastfeeding-related topics.

This study includes the following time points:

Table 1: Relevant time points for the RCT

Time point name	Baby's age
TR – Registration	Pregnancy stage
T0 - First questionnaire following birth	From birth up to 3 weeks
T1 – Second questionnaire following birth	3-6 weeks postpartum

Outcomes of this RCT refer to the time points TR, T0 and T1 of the cohort.

Consent and study information

TR provided the study information for participants, including the intention to publish anonymized results. After confirming in a mandatory field that they had read and understood the study information, and consenting to their participation by providing their signature, participants were included in the study, at the time point TR of registration.

99 *Language and pre-testing*

100 Participants could select either the German or English language for their questionnaires. Pre-
101 tests of 35 native speakers from both language backgrounds were conducted for all time
102 points of the cohort, and resulted in an average of 20-30 minutes time used per questionnaire,
103 including mandatory and optional questions.

104

105 *Sample size calculation*

106 Our calculation of sample size of the cohort was based on the KIGGS study, a large survey on
107 child health in Germany (Brettschneider et al., 2018). Aiming at recruiting up to 1,000
108 participants, and presuming a conservative 54% dropout rate, we calculated a minimum of
109 460 responding participants for the cohort (Ng et al., 2016). When calculating the power
110 sample for the RCT, we expected a difference of about 15% between groups with regards to
111 the two primary outcomes of any early pain and complications related to breastfeeding, and of
112 exclusive breastfeeding. Our power sample was ≥ 170 cases for the RCT with a power of
113 81%.

114

115 *Inclusion criteria*

116 Inclusion criteria were: mother aged 18 or more, recruitment during pregnancy, birth from
117 week 37, singular birth (no multiples), healthy mother-baby dyad, no substance abuse, Email
118 address for Redcap automatic invitations, German or English speaker proficient in the written
119 language.

120

121 *Verification of inclusion*

122 Several items both at TR and T0 verified whether inclusion criteria were being met, e.g. age
 123 of mother, habits related to alcohol, smoking or drugs, illnesses of mother and child,
 124 gestational age at birth and more.

125

126 *Automatic invitations by Redcap*

127 In this strictly online study, Redcap provided 3-5 automatic invitations per time point to the e-
 128 mail of the participants stated at registration.

129

130 *Intervention and control instruments*

131 During pregnancy the intervention group was invited to watch the BN film, while the control
 132 group watched a film by Global Health Media named “Attaching your baby at the breast”
 133 containing traditional breastfeeding positions (eg cradle, cross cradle, football).

134 We prepared two versions of each film, intervention and control, both in German and English:

135 1. We purchased the intervention BN film in its original English version from Geddes
 136 productions, USA, and obtained permission to use it for our RCT

137 2. We post-produced a new German version of the BN film with a professional German
 138 speaker

139 3. We cut out a scene of a few seconds showing the laid-back position in the English and
 140 German version “Das Anlegen des Babys an der Brust” of the Global Health Media film for
 141 the control group

142 4. We received permission from Global Health Media to use the film for our RCT.

143

144 *Randomization*

145 Redcap software provided the randomization by allocating participants alternatively to the
 146 intervention or control groups. Redcap was programmed to automatically provide the link to

the respective film upon completion of registration and according to the selected language.

Additionally, the link was also sent to participants by email automatically by Redcap.

Recruitment during pregnancy

Recruitment was carried out during antenatal care both by invitation from healthcare

providers and by self-selection through posters, displaying an invitation link and QR code.

Invitation posters were displayed at hospital maternity, delivery and antenatal care wards, at

the University Hospitals Charité Mitte and Virchow, Ulm, Leipzig, Erlangen, Bonn, Tübingen

and Filderstadt, of which only Ulm, Tübingen and Filderstadt had Baby-Friendly Hospital

Initiative (BFHI) status during the recruitment phase, reflecting the low uptake of the BFHI in

Germany of 15% (2018/2023 WBTi Germany reports at

<https://www.worldbreastfeedingtrends.org/>). The BFHI is a global accreditation program that

promotes policies, guidance, staff training, and organizational practices to support successful

breastfeeding initiation. La Leche League Germany supported recruitment both by personal

invitation and on their website, by adding our invitation poster to their online announcement

of antenatal classes. Other associations recruiting via social media and through their

professional and social networks were: The Professional Association of German Lactation

Consultants (BDL), Training Center for Lactation and Breastfeeding (AZ) and the Baby-

Friendly Hospital Initiative Germany (BFHI).

Assessing mothers' compliance to watch the intervention and control films

We verified which participants had watched their respective film by including one item at T0

(see Figure 1).

Figure 1: Verification item for inclusion in the RCT

[Insert Figure 1]

Participants were encouraged to use whatever breastfeeding position worked best for them. However, we used a recurring item to elicit which breastfeeding positions mothers were using proportionally in real time during the day (7am to 7pm) and the night (7pm to 7am).

Ethics approval, Registration of the RCT

The study received ethics approval by the Charité University Hospital as the study center (No. EA2/003/23), and by the University Hospitals Leipzig and Ulm, which required their own ethics approvals, according to their hospital policies. The RCT was registered at the German registry of clinical trials, to be published on the WHO portal for Randomized Controlled Trials <https://trialsearch.who.int>.

Data analysis

The SPSS statistics program version 31.0 was used for statistical evaluations of quantitative items for data descriptions and to calculate Chi square, sample size, frequencies, percentages, mean and median values. Between-group comparisons were conducted using the Mann-Whitney U-test. All open-ended comments were analyzed using Google Gemini for content analysis, categorization and pre-translation. These categories and their translations were subsequently reviewed, refined and validated manually by members of the research team.

Results

Sample characteristics

197

198 Of the 799 potential participants who scanned the QR code or used the invitation link, 140
 199 provided insufficient or incorrect information for follow-up purposes. Incomplete registration,
 200 either just scanning the code, but not answering any questions, or missing out on vital
 201 information, e.g., invalid email address, missing due date, missing inclusion criteria to
 202 continue the study, were excluded. Registrations lacking essential follow-up information and
 203 two participants who withdrew their consent were deleted from the survey.

204

205 Reasons for exclusion from our real-life trial included intrauterine death, change of e-mail
 206 address without notification, registering with multiples, sudden severe illness of mother or
 207 baby and retrospective registration of mothers after birth. Several colleagues from the field of
 208 lactation registered, too, and had to be identified and deleted. Finally, we were able to include
 209 505 participants in the BALANCE cohort study.

210

211 Eight mothers gave birth in a country other than Germany, either in a process of emigration
 212 from Germany abroad, or by finding our QR code for registration on social media, while
 213 never having lived in Germany. The residence countries of these eight participants are
 214 Austria, Bolivia, Belgium, Japan, Sweden, Switzerland (n=2) and the USA.

215

216

217 **Randomized Controlled Trial**

218

219 *Inclusion in the RCT*

220 The primary analysis was conducted per protocol, including only participants who confirmed
 221 viewing the allocated film at least once in full (Figure 1). Participants who watched it at least

once (n=311) or several times (n=69) were included (n=380), the rest was excluded, because they only watched it partially (n=42) or not at all (n=81), with 2 missing responses (see Figure 2) (Hopewell et al., 2025).

Figure 2 – Flow chart based on CONSORT

[Insert Figure 2]

From the 40 comments of mothers who could not watch the film at least once in full, 54% provided diverse and sometimes unrelated comments, while 46% explained why they were not able to watch their respective film. Their comments could be categorized into the following groups: 28% did not watch the video due to time constraints, forgetting about it e.g. amidst the stress of birth. 18% of mothers felt they were already well-informed through midwives or previous children, stating that they had already breastfed their other children successfully and therefore felt they did not need to watch the film.

Comparability of key characteristics in the intervention and control groups

Table 2 details the key characteristics of participants in the intervention and control groups. No significant differences were identified between the groups, indicating that the groups were comparable.

Table 2: Comparison of key characteristics in the intervention and control groups (n=380 / all not significant)

	Intervention (BN film) n = 178	Control (Global Health Media film) n =202
Sex Infant	Male: 48% (n=86) Female: 52% (n=92)	Male: 46% (n=92) Female: 54% (n=110)
Gestational age	mean = 40 weeks SD = 1.2 weeks	mean = 40 weeks SD = 1.2 weeks
Age of the Mother	mean = 33.4 years SD = 3.5 years	mean = 33.7 years SD = 3.7 years
Nationality non-German	10.1%	10.4%
Marital status	76%	73%
Highest education	82%	82%
Permanent employment	76%	75%
Annual net income > €50,000	73%	69%
Primiparae mothers	57%	65%
Smoking before pregnancy	17%	11%
Alcohol before pregnancy	80%	79%
Other substances before pregnancy	6%	6%

Vaginal birth	73%	77%
Caesarian birth	27%	23%
Gave birth at: Non-BFHI hospital	61%	68%
BFHI hospital	27%	21%
Birthing center	7%	7%
Home birth	5%	4%

Four participants included in the RCT gave birth in Bolivia (n=1), Belgium (n=1), Japan (n=1) and Switzerland (n=1), the rest of participants were resident and gave birth in Germany (n=376).

Real-time usage of BN

Since our study was strictly online, we needed to verify whether there was any usage of BN in our sample. We therefore asked mothers which breastfeeding positions they used during the day and night, and in what proportion, to examine whether BN was being used in either the intervention or control group in real-world practice.

Overall, mothers in the intervention group used BN significantly more during day and night combined ($p=0.02$). During the daytime, BN use was significantly higher in the intervention group (mean 19%) compared with the control group (mean 10%) ($p = 0.003$), representing almost double the level of use. However, there was no significant difference between intervention and control groups during the night regarding to BN usage, when most participants were using the side-lying position with a mean of 42% (control) and 46% (intervention).

Primary outcome: Complications or pain in connection with breastfeeding

The following table shows the primary outcome results of early breastfeeding problems including any pain or complications with regards to breastfeeding. The results show a significant difference in favor of the intervention group at both time points T0 and T1.

Table 3: Primary outcome of breast problems at time points T0 and T1

Pain / complications in connection with breastfeeding	Intervention (BN film)	Control (Global Health Media film)	Chi square
T0 Birth-21 days postpartum	n = 174	n = 200	
Yes	62% (n = 108)	77% (n = 154)	
No	38% (n = 66)	23% (n = 46)	p = 0.002 OR = 0.49 CI = 0.31-0.77
T1 22-42 days postpartum	n = 147	n = 167	
Yes	44% (n = 65)	56% (n = 94)	
No	56% (n = 82)	44% (n = 73)	p = 0.03 OR = 0.62 CI = 0.39-0.96

Differences in complications between intervention and control

At time point T1 (22–42 days postpartum), the significant difference between the intervention and control groups that had been observed at T0 (birth to 21 days postpartum) remained evident (Table 3), demonstrating that up to 3 weeks postpartum, any pain and complications were significantly lower in the intervention group.

Specification of symptoms at time point T0

A filter question was used to determine the specific breast problems that participants had experienced, and for participants to rate both their level of pain and complication using a scale of 1-10. While the number of participants experiencing complications was generally higher in the control group, no significant differences were found in the incidence of the different types of complications between the intervention and control groups (see Table 4).

Table 4: Types and incidence of complications at T0 (n=380 / all not significant)

Complication	Incidence intervention (n=178)	Incidence control (n=202)	p
Sore nipples	42% (n = 74)	49 % (n = 99)	0.15
Pain	40% (n = 71)	47% (n = 94)	0.19
Cracked nipples	20% (n = 36)	22% (n = 45)	0.63
Insufficient milk supply	15% (n = 27)	15% (n = 31)	0.96
Too much milk	11% (n = 19)	13% (n = 27)	0.42
Other*	5% (n = 8)	7% (n = 14)	0.31
Engorgement	11% (n=19)	9% (n=18)	0.45

Clogged ducts	3% (n = 6)	4% (n = 8)	0.76
Mastitis	2% (n = 4)	2% (n = 4)	0.86

*These included nipple trauma, vasospasm, discomfort during feeding, and positioning-related musculoskeletal strain.

Only “engorgement” showed a slightly higher incidence in the intervention group (11% vs. 9% control / $p = 0.45$). Engorgement can be considered as less pathologic than most of the other symptoms at this early stage of lactation, and could even be perceived positively, as a sign of early plentiful milk supply, including milk coming in initially after the colostrum phase.

The pain scale ranging from 1-10 scored a median of 6 in the control group, while the intervention group scored a median of 5 ($p = 0.9$). The intensity of complications on a scale of 1-10 scored equal in both groups, with a median of 5 ($p = 0.68$). The duration of early postpartum pain from birth to 21 days, complications and breast or other problems was equal in both groups (Median = 5 days).

Second primary outcome: Exclusive breastfeeding

Exclusive breastfeeding including feeding the mother’s own expressed breastmilk, according to the WHO definition, was our second primary outcome. At T0 between birth and 3 weeks postpartum exclusive breastfeeding was slightly higher in the intervention group compared to the control (78% versus 76% / $p=0.67$), even though not significant, while more mothers were feeding expressed breastmilk in the control group compared to the intervention (29% intervention versus 35% control / $p=0.26$). At T1 from 22-42 days postpartum, exclusive

breastfeeding was also slightly higher in the intervention group compared to the control (90% versus 89%), but not significantly ($p=0.70$).

Experience with breastfeeding: Enjoyment and satisfaction at time point T0

No significant differences were found between groups regarding the mothers' enjoyment of breastfeeding (61% intervention versus 54% control / $p=0.19$). Babies' satisfaction, as perceived by their mothers, was also not significantly different between the groups, both in terms of their babies' general satisfaction (46% intervention versus 44% control/ $p=0.94$), and their babies' satisfaction during breastfeeding (36% intervention versus 32% control / $p=0.92$). However, consistent throughout the findings, the intervention group did not show unfavorable outcomes compared to the control group in any of the above mentioned outcomes.

How helpful did the mothers perceive their respective film

Overall, 76% of participants in both groups considered their allocated film as helpful or very helpful for successful breastfeeding initiation at T1 (22-42 days postpartum). Qualitative responses to the film being helpful were categorized into five thematic groups, using Google Gemini ($n=90$): 32% appreciated the visualization of seeing real babies and diverse breast shapes with exemplary latching rather than dolls, and stated that it served as a refresher for experienced mothers; 21% explicitly appreciated the BN film for its novelty and the relaxing and pain-releasing properties of the BN position; 19% of mothers mentioned that even though the film was helpful, their own start into motherhood was more challenging than the idealized picture represented in both films; 16% felt they would have needed the film for the sibling(s) back in time, wishing they had seen this sooner. Another 12% mentioned that even though the film was helpful they still needed the "human touch" for latching support.

Discussion

Overall, while our RCT demonstrated no impact on exclusive breastfeeding rates, mothers exposed to the BN position experienced significantly less pain or complications with breastfeeding at 3 weeks postpartum when compared to the control group. The incidence of specific breastfeeding complications was slightly higher in the control group, except for engorgement. However, an excessive milk supply during the initiation stage of breastfeeding can be managed with lactation consultant support, while establishing an adequate and sustainable milk supply remains one of the primary goals of lactation care.

Despite mothers being encouraged to select their breastfeeding positions individually, there was nearly double the usage of BN by the intervention group during the day. This confirmed that watching the BN film had clearly influenced participants' choice of breastfeeding positions in favor of BN. Our findings echo those of the meta-analysis by Wang et al. who also found significantly less nipple pain and trauma amongst mothers exposed to BN in the intervention group, when compared to the control group (Wang et al., 2021). Moreover, our study resulted in an even higher significance of reduced complications and pain regarding breastfeeding when compared to Wang and the Milinco study (Milinco et al., 2020). Most studies included in Wang's meta-analysis elicited slightly different categories of pathology related to breastfeeding, and therefore comparison was only possible to a limited degree. Our study also reflects the findings of Gabhart et.al. which concluded that antenatal web-based education can improve breastfeeding rates (Gabhart et al., 2024).

Our study strengthens the current evidence supporting BN as a favorable approach during breastfeeding initiation. However, the lack of impact on exclusive breastfeeding rates

suggests that positioning interventions alone may be insufficient to sustain exclusive breastfeeding. These findings thereby align with evidence that antenatal education alone is insufficient to improve breastfeeding outcomes (Lumbiganon et al., 2016). They also highlight the importance of ongoing breastfeeding support reflected in Wang’s review (Wang et al., 2021), as well as a wealth of literature about the need for proactive, timely and personalized breastfeeding support (McFadden et al., 2019) (Renfrew et al., 2012), highlighting the importance of ongoing breastfeeding support in the sense of integrated care (Rosin & Zakarija-Grković, 2016). This finding was also reflected in our qualitative data, with several mothers still emphasizing the need for a “human touch” for latching support.

The relatively low initial rates of exclusive breastfeeding of approximately 70% at T0 from birth to 21 days postpartum in both groups, which increased to 90% after hospital discharge at the time point T1 from 22-42 days postpartum in both groups, could be associated with the low rate of births in Baby-Friendly hospitals of 24% (Table 2). This may also reflect the limited uptake of the BFHI initiative in Germany with only 15% of hospitals accredited (Zakarija-Grković et al., 2020). Sixty-five percent of babies were born in non-accredited hospitals, who are not obliged to apply strictly medical indications for the supplementation of formula, while early use of formula may lead to discontinuation of breastfeeding and reduced breastfeeding duration (Li et al., 2023). As BN may therefore provide an additional evidence-informed approach to supporting mothers during breastfeeding initiation and early breastfeeding experiences, further work exploring the integration of BN within BFHI-accredited services is needed.

It was striking that several mothers appreciated the BN film as “novelty”, nearly two decades after the release of Colson’s first article on BN (Colson et al., 2008), showing a very

slow implementation of improved approaches in maternity healthcare. With 76% of mothers evaluating their respective film from both groups as helpful or very helpful, it can be assumed that such a low-cost and easy-to-do antenatal education would be well received by mothers, alongside appropriate lactation support.

Strengths and limitations

Weaknesses of the study

Allocation by alternation constitutes quasi-randomization. However, despite this weakness, there were no potential significant differences in the key characteristics of mothers and babies in both groups, thus confirming the comparability of both intervention and control groups.

Overall, participants' socio-economic status was high, compared to the average population in Germany (Sievers et al., 2018) (Brettschneider et al., 2018). According to the state of the art, both in Germany and in other high-income countries, mothers with a higher socio-economic status are more likely to breastfeed (Cohen et al., 2018; Simpson et al., 2022), rendering this sample representative for high income groups in highly industrialized countries only. Further work to elicit the impact of BN on mothers who are less likely to breastfeed (e.g., younger, less educated) is needed.

Participation in this online study depended on a certain level of literacy and technical skills of participants, thus potentially excluding illiterate and technically unskilled mothers. Even though the survey was optimized in Redcap for mobile devices, some participants complained that the survey was difficult to navigate on a mobile phone, which made data entry more challenging for participants.

Since the registration was partly self-selected by posters with QR codes, and the study was fully online with no personal contact included, this meant less control of compliance with the intervention. We aimed to counter this weakness with a verifying item to obtain confirmation of mothers that they have watched the film as the intervention at least once in full, however, the potential for recall bias cannot be eliminated.

Strengths of the study

The strengths include using an online survey. This approach was designed to increase the objectivity of replies, since there is no interviewer who might influence the tendency of responses, a phenomenon known as an interviewer bias.

Our study also had a power exceeding 81%, since the sample size exceeded the required participants of 170 per group.

As response rates were high, this demonstrates a good level of participant engagement and suggests that the study procedures were not overly burdensome.

Conclusion

This study adds to the existing evidence supporting Biological Nurturing as an effective approach to lower rates of early breastfeeding-related problems, which are recognized contributors to early breastfeeding discontinuation. This result was achieved by only showing a film during pregnancy as antenatal education, which was well received by mothers. However, the absence of a difference in exclusive breastfeeding rates suggests, consistent with the wider literature, that antenatal education alone may be insufficient to improve

exclusive breastfeeding rates. Seeing such a film during pregnancy may represent a low-cost and easy-to-do antenatal strategy to reduce complications, however, it does not negate the need for ongoing breastfeeding support from lactation consultants, midwives, or peer supporters, and the application of BFHI standards. Further research exploring the optimal level of breastfeeding support alongside instruction in Biological Nurturing could examine the effectiveness of this intervention in lower-income populations in Germany and in low-income countries to determine its applicability across diverse populations and cultural contexts.

Outlook

Our study is currently still ongoing in 2026, because several mothers are still breastfeeding over one year. More publications of the BALANCE cohort study on the various topics related to breastfeeding are planned, e.g. a publication detailing the implications for lactation consultant practice, and on birth, breastfeeding support, sleep, bonding, introduction of solids and many more.

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