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## Research article

## Feasibility study of the calm baby gently program: An educational baby book intervention on safe practices related to infant crying

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## ABSTRACT

**Background:** Abusive head trauma (AHT) is a preventable form of child abuse.**Objective:** This project used a mixed method design to assess the feasibility of the Calm Baby Gently educational baby book intervention for promoting safe practices related to infant crying in an effort to prevent AHT.**Participants and setting:** Three pediatric practices participated between June 2016 and January 2018, including 1045 caregivers who attended their infant's 2-month well-child visit.**Methods:** Pediatric providers gave the educational baby book to caregivers at the 1-month well-child visit. Caregivers completed a survey at the 2-month well-child visit on their use and satisfaction with the book and responses to infant crying. Thematic analysis of qualitative feedback was performed. Responses to infant crying were compared quantitatively between caregivers who had and had not read the book.**Results:** Of the 819 caregivers (78%) who received the book, 92% (754) read it, and 51% (421) had another caregiver read it. Caregivers considered the book approachable, understandable, validating, and helpful for improving knowledge and skills related to infant crying. The book was rated more helpful by caregivers of younger age, male gender, and non-white race. Controlling for age, gender, and race, caregivers who read the book were more confident ( $p = 0.033$ ) and had more knowledge on how to respond appropriately to infant crying ( $p = 0.019$ ) than caregivers who had not read it.**Conclusions:** Calm Baby Gently is a feasible and well-received AHT prevention program. Randomized controlled trials are needed to better understand its impact on knowledge, behavior, and AHT rates.

## What Is Known

Abusive head trauma (AHT) is a preventable form of child abuse that occurs most often from 1 to 3 months of age and results in poor outcomes. Effectiveness of prevention programs that educate parents on normal infant crying and safe coping varies.

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## What This Study Adds

Calm Baby Gently is a feasible and well-received AHT prevention program that uses an innovative educational baby book approach to delivering anticipatory guidance on safe practices related to infant crying shortly preceding the period of greatest risk for AHT.

### 1. Introduction

Abusive head trauma (AHT) is a preventable form of child abuse from violent shaking and the most frequent cause of traumatic mortality in infants (Ortega, Vander Velden, Kreykes, & Reid, 2013). AHT occurs most often from 1 to 3 months of age (Parks, Kegler, Annett, & Mercy, 2012; Parks, Sugerman, Xu, & Coronado, 2012). Those children who survive are at increased risk of long-term neurologic injury (Barlow, Thompson, Johnson, & Minns, 2004; King, MacKay, & Sirnick, 2003). It is estimated that the lifetime cost of a fatality from AHT is \$5.7 million and a non-fatality is \$2.6 million (Miller et al., 2018). These costly outcomes could be prevented with early education and support for caregivers.

Several AHT prevention programs involve parent education on infant crying, dangers of shaking, and coping methods, typically through an informational booklet, pamphlet, and/or video delivered in the birth hospital (Allen, 2014). Such programs have shown improvements in parent knowledge (Barr, Rivara et al., 2009; Barr, Barr, et al., 2009; Fujiwara et al., 2012) and reductions in AHT rates (Altman et al., 2011; Barr et al., 2018; Dias et al., 2005), although not all studies have replicated this effect (Dias et al., 2017; Keenan & Leventhal, 2010; Zolotor et al., 2015).

The Calm Baby Gently program was developed to prevent AHT through caregiver education on safe practices related to infant crying and differs from other programs in its timing and delivery. This program is delivered to caregivers at the 1-month well-child visit when risk for AHT and crying, a major trigger for AHT, begin to peak (Lee, Barr, Catherine, & Wicks, 2007). It is delivered by primary care providers (PCP) through an educational baby book, as research has shown this to be an effective method for PCPs to deliver anticipatory guidance to parents on other topics, including safety (Bauer et al., 2012; Hutton et al., 2017; Jones et al., 2000; Reich, Bickman, Saville, & Alvarez, 2010; Reich, Penner, & Duncan, 2011; Reich, Penner, Duncan, & Auger, 2012). Books are also more likely to be kept and shared with other caregivers including fathers, stepfathers, and boyfriends, who are more often perpetrators of AHT (Nuño, Pelissier, Varshneya, Adamo, & Drazin, 2015; Starling, Holden, & Jenny, 1995).

The purpose of this project was to evaluate the feasibility of using an educational baby book on promoting safe practices related to infant crying within pediatric primary care. Specifically, this project assessed caregiver utilization of and satisfaction with the book. A secondary purpose was to evaluate associations between book utilization and caregiver knowledge, stress, and confidence related to infant crying.

### 2. Methods

#### 2.1. Participants

The Calm Baby Gently program was implemented within three Midwestern private pediatric group practices with nine total practice locations between June 2016 and January 2018. Participants were caregivers who attended their infant's 1- and/or 2-month well-child visits during the project period. Table 1 contains demographic characteristics of the caregiver samples from the three practices. This project was approved by our Institutional Review Board, and informed consent was waived.

#### 2.2. Intervention

Pediatric PCPs gave the educational baby board book, "Calm Baby Gently," written by pediatrician, Dr. John Hutton, as a gift to caregivers at their infant's 1-month well-child visit (Fig. 1). The 14-page book conveys safe parenting and health practices related to infant crying through gentle rhymes, simple language, and culturally sensitive illustrations. It is written from the infant's perspective and illustrates the peaking of crying from 1 to 4 months of age. Estimated Flesch-Kincaid reading level is 1<sup>st</sup> grade for main text and 4<sup>th</sup> grade for bullet points on the back. The book is available in English and Spanish. PCPs used the book as a prompt to discuss anticipatory guidance related to infant crying, dangers of shaking, and benefits of shared reading with the child starting at birth. Caregivers were encouraged to read the book at home with their infant and share the book with other people who care for their child. The national Crying Baby Helpline number was printed on the back and on a bookmark, which gave advice for what to do if their infant would not stop crying. PCPs had a list of talking points to provide when giving the book.

A survey was given to caregivers at their infant's 2-month well-child visit to assess their responses to infant crying and utilization and satisfaction with the book. PCPs had the opportunity to use the survey as a clinical tool to assess caregiver concerns and provide additional education and resources if needed.

#### 2.3. Measures

The survey questions are included in Table 1. The survey also asked for "your relationship to baby" and "what did you think of the book?". The survey questions have not been validated. The 6-point Likert scale was selected for the stress, confidence, and helpfulness questions in order to capture variability between caregivers without allowing for neutral responses.

**Table 1**  
Characteristics of Caregiver Sample by Practice.

Characteristic	Survey Question	All Practices N = 1,045	Practice 1 N = 399	Practice 2 N = 348	Practice 3 N = 298	$\chi^2$ (p-value)
<b>Demographics</b>						
Age (years)	Your age	31 (28-34)	32 (29-34)	30 (26-34)	30 (27-33)	26.4 (< 0.0001)*
Gender	Your gender	960 (92%)	380 (95%)	301 (87%)	279 (94%)	18.6 (< 0.0001)*
Female		81 (8%)	18 (5%)	44 (13%)	19 (6%)	
Male						
Race	Your race/ethnicity					113.4 (< 0.0001)*
White		851 (84%)	363 (93%)	223 (66%)	265 (92%)	
Non-White		164 (16%)	27 (7%)	113 (34%)	24 (8%)	
<b>Infant crying</b>	About how many hours a day does your baby cry? (open response)	1.5 (1-2)	1.5 (1-2)	1.5 (1-2.5)	1.5 (1-2)	4.1 (0.13)
<b>Stress</b>	How stressed or overwhelmed are you by your baby's crying? (from 1 "not at all" to 6 "very")	2 (1-3)	2 (1-3)	2 (1-2)	2 (1-3)	7.5 (0.024)*
<b>Confidence</b>	How confident are you that you can calm yourself down if your baby does not stop crying? (from 1 "not at all" to 6 "very")	6 (5-6)	6 (6-6)	6 (5-6)	6 (5-6)	1.5 (0.48)
<b>Knowledge<sup>a</sup></b>	When your baby is crying, what do you do? (open response)	3 (2-5)	4 (3-5)	3 (2-4)	4 (2-4.25)	7.3 (0.027)*
	If you feel stressed or overwhelmed by your baby's crying, what do you do to calm yourself down? (open response)					
<b>Book acquisition</b>	Did you receive the book, Calm Baby Gently, at your child's last doctor's visit? (yes/no)	819 (78%)	394 (99%)	320 (92%)	105 (35%)	462.8 (< 0.0001)*
<b>Book utilization</b>	About how many times have you read this book? (open response)	2 (1-3)	1 (1-2)	2 (1-3)	2 (1-3)	22.3 (< 0.0001)*
	Have you read this book? (response > 0 to the question above)	754 (92%)	364 (92%)	294 (92%)	96 (91%)	0.1 (0.94)
	Have you read this book to your baby? (yes/no)	442 (54%)	171 (43%)	201 (63%)	70 (67%)	34.6 (< 0.0001)*
	Has anyone else who cares for your baby read this book? (yes/no)	421 (51%)	182 (46%)	186 (58%)	53 (50%)	10.1 (0.006)*
<b>Book satisfaction</b>	How helpful was this book to you? (from 1 "not at all" to 6 "very")	4 (3-6)	3 (2-4)	5 (3-6)	4 (3-5)	82.1 (< 0.0001)*

Notes: N (%) or median (interquartile range) are reported; <sup>a</sup>The caregiver responses to these two open response questions were combined, and each response that matched a responses to infant crying that was described in the book (checking for fever, feeding, changing diaper, holding, rocking gently, gently touching, talking in a calming voice, playing soft music, singing, going for a walk, breathing, calling a doctor if the baby had a fever, putting the baby down somewhere safe, and asking for help) or on the bookmark (calling a relative or friend or the Crying Baby Helpline) was counted; \*p < 0.05 indicates statistical significance.



Fig. 1. Calm Baby Gently.

2.4. Data analysis

Descriptive statistics were used to characterize the sample demographics. **Analyses included qualitative and quantitative methods.** A thematic analysis using the approach recommended by Braun and Clarke (2006) was performed on the qualitative caregiver responses of what they thought of the book. Two independent reviewers (E.A.E and J.T.) read each response and assigned codes to describe the meaning behind each. The codes and coded data extracts were then consolidated and grouped within broader themes to create a thematic map. The two reviewers compared their predominant themes and used collaborative discussion to decide on final themes and specifics of each (e.g. name, definition, characteristics). Example extracts/quotes are provided to illustrate the meaning behind each theme.

Non-parametric analyses were performed on quantitative measures due to skewness; therefore, medians, interquartile ranges, and Spearman correlation coefficients are reported. Practices were compared using Chi-square tests for dichotomous variables and Kruskal Wallis tests for continuous variables. Caregivers who did and did not read the book were compared using Fisher exact tests for dichotomous and Mann-Whitney U tests for continuous demographic and outcome variables. **For logistic regression analyses,** binary variables were created from the continuous variables of stress (low = 1–2 [74%], high = 3–6 [26%]) and confidence



(low = 1–3 [4%], high = 4–6 [96%]) because of the considerable skewness of their distributions. Logistic regression was used to model whether or not the caregiver read the book was a significant predictor of the outcomes of stress and confidence (in separate analyses) while adjusting for age (binary, < 28 vs.  $\geq$  28 years), gender, and race. A general linear model was used to test whether or not the caregiver read the book was a significant predictor of the number of responses from the book (which was approximately normally distributed) while adjusting for age (binary, as above), gender, and race. A multiplicative term was included to assess for interactions between main effects and age, gender, and race. Analyses were performed in SAS 9.4.

### 3. Results

#### 3.1. Sample characteristics

The survey was completed by 1045 caregivers, including 91% (948) mothers, 8% (81) fathers, < 1% (2) aunts, and 1% (14) with unknown relationship. The racial distribution included 81% (851) white/Caucasian, 8% (81) black/African American, 4% (40) Asian, 2% (21) Hispanic/Latino, 2% (22) other or multiracial, and 3% (30) unknown. Additional demographics and characteristics by practice can be found in [Table 1](#).

#### 3.2. Book acquisition

Of the 1045 caregivers who completed the survey, 819 (78%) received the book at the 1-month well-child visit. Older caregivers were significantly more likely to receive the book than younger caregivers ( $z = -2.43, p = 0.015$ ). Caregivers of non-white race were significantly more likely to receive the book (87%, 137/157) than caregivers of white race (78%, 660/845;  $p = 0.009$ ). Likelihood of receiving the book did not differ significantly by gender ( $p = 0.66$ ).

#### 3.3. Book utilization

Of the 819 caregivers who received the book, 92% (754) read the book, and 51% (421) indicated that another caregiver read the book, for a total of 1175 caregivers who read the book. About half (54%, 442) read the book to their baby. Caregivers of non-white race were significantly more likely to read the book (81%, 123/152) than caregivers of white race (73%, 611/840;  $p = 0.035$ ). Whether or not the book was read did not differ significantly by age ( $z = -1.24, p = 0.21$ ) or gender ( $p = 0.79$ ). However, the book was read significantly more times by caregivers of younger age ( $r = -0.09, p = 0.021$ ), female gender ( $z = -1.96, p = 0.050$ ), and non-white race ( $z = 2.30, p = 0.021$ ).

#### 3.4. Caregiver satisfaction

Nearly all (98%, 741/754) caregivers who read the book rated how helpful it was to them, with 93% (691/741) rating it as helpful to some degree and a median rating of 4 “somewhat helpful”. The book was rated as significantly more helpful by caregivers of younger age ( $r = -0.16, p < 0.001$ ), of male gender ( $z = 2.41, p = 0.016$ ), of non-white race ( $z = 5.62, p < 0.001$ ), and who read the book more times ( $r = 0.30, p < 0.001$ ).

A total of 482 (64%) caregivers who read the book provided an open response to what they thought of it. Qualitative analysis revealed six main themes. The first, most salient theme was that the book was well-received by caregivers, being a good reminder of information that many already knew. Second, the book had an approachable and understandable message. Caregivers considered it well-illustrated with simple to understand language, a calming and soothing tone, and an important message. Third, the book was suggested as particularly beneficial for specific audiences, including first time, young, stressed, depressed, or single parents and other adult caregivers (e.g. grandparents). Several caregivers mentioned finding the book helpful for teaching their other children about why their infant sibling cries and to care for them gently. Fourth, the book equipped caregivers with strategies to help them calm their infants when crying and to calm themselves. It also promoted them asking for help and reading to their infant. Fifth, the book validated and normalized their experience of stress related to infant crying. It helped them feel more confident in caring for their infant and reassured them that it’s okay to take a break and ask for help. Sixth, the book improved their knowledge of infant development by reminding them that crying is how infants communicate and is normal and temporary. Representative quotes for each theme can be found in [Table 2](#).

#### 3.5. Caregiver responses to infant crying

Caregivers who read the book gave significantly more responses from the book on what to do to calm their infant or themselves during infant crying than caregivers who did not read the book ( $z = -2.35, p = 0.019$ ), which remained significant after controlling for age, gender, and race ( $\beta = 0.31, 95\% \text{ CI: } 0.09\text{--}0.53, p = 0.007$ ). Of those who read the book, caregivers who read it more times gave **significantly** more responses from the book ( $r = 0.12, p = 0.001$ ). A greater number of responses from the book was given by caregivers of female gender ( $z = -2.70, p = 0.007$ ), of white race ( $z = -5.29, p < 0.001$ ), and with greater stress related to infant crying ( $r = 0.22, p < 0.001$ ). There was no **significant** correlation with age ( $r = 0.01, p = 0.65$ ) or confidence ( $r = -0.05, p = 0.097$ ).

Caregivers who did and did not read the book did not **significantly** differ in their stress related to infant crying ( $z = 0.22, p =$

**Table 2**  
Thematic Analysis of Caregiver Feedback on the Calm Baby Gently Program.

Themes	Representative quotations
<b>Well-received</b>	
Good reminder/reinforcing	“It was a great reminder on caring for baby properly.”
Already known	“It is a very well-written and illustrated book but it didn't have any information I didn't already know.”
<b>Approachable and understandable</b>	
Cute message and illustrations	“It was a cute book and well-illustrated.”
Simple to understand message	“Thoughtfully written with simple language – had older siblings read it to baby.”
Calming, soothing message	“I thought the book was soothing.”
Important message	“It's sweet and a kind way of delivering an important message.”
<b>Beneficial for specific audiences</b>	
First time parents	“Helps new parents know the right steps to calm a baby and what not to do.”
Young parents	“Book is good for someone that maybe is younger and not sure of things.”
Parents with little support	“Great resource for new parents with no support at home.”
Siblings	“It was helpful in communicating gentle touch for baby with my four and five year olds!” “Explains at a child's mentality level how to take care of a baby. Good for children.”
Other adults/caregivers	“Good reminders, helpful for other caregivers (grandparents).” “It's good for people who've never been around babies.”
<b>Equipping</b>	
Provides strategies to calm infant	“It showed ways to calm your baby and that it's okay to put baby down and walk away for a few.”
Provides coping strategies for caregivers	“Gave coping mechanisms in non-technical manner.”
Promotes asking for help	“Made me think about being calm for my baby and that it's okay to ask for help when feeling overwhelmed.”
Promotes reading to infant	“A sweet story to read to infant.”
<b>Validating</b>	
Normalizes experience	“Knowing that stress can be normal and I'm not a bad parent.” “Was a reminder we're not alone.”
Reassures	“It helps make me feel more confident in caring for a crying baby.” “That it's okay to feel overwhelmed. The best way to cope is love your baby and give her to someone else while you calm down.”
Promotes empathy toward infant	“Put things into perspective. Babies cannot control their crying/you can control your reactions.” “Baby's perspective new to world, baby getting used to everything.”
<b>Educational</b>	
Informational	“It was informative and reiterated ideas on how to calm down baby and myself that I had already been doing.”
Improves knowledge of infant development	“It's a reminder that crying is the way babies communicate.” “The most helpful piece of info is on the back letting me know crying happened most during 1-4 months of age.”

0.83). Caregivers who read the book were significantly more confident in their ability to calm themselves if their infant did not stop crying than caregivers who did not read the book ( $z = -2.13, p = 0.033$ ). When controlling for age, gender, and race, caregivers who did not read the book had 2.35 times greater odds of having low confidence than caregivers who read the book (OR = 2.35, 95% CI: 1.17–4.74,  $p = 0.016$ ). Number of times the book was read did not **significantly** correlate with stress ( $r = 0.04, p = 0.24$ ) or confidence ( $r = -0.04, p = 0.28$ ).

#### 4. Discussion

The Calm Baby Gently program, which aims to prevent AHT by promoting safe parenting practices in response to infant crying, was successfully implemented within three pediatric group practices. Over two-thirds of caregivers stated that they received the educational baby book at the 1-month well-child visit, and at seven of the nine practice locations, over 90% of surveyed caregivers received it. These findings support that the program is feasible to incorporate into routine pediatric primary care without additional resources beyond the book. Nearly all caregivers (92%) who received the book read it, which is encouraging when compared to prior studies that found only 23–52% of parents remembered watching a video delivered by nurses in birth hospitals (Dias et al., 2005, 2017). Furthermore, over half (51%) of caregivers indicated that another caregiver read the book, confirming that the message also reached an audience of caregivers other than mothers, who are more often the perpetrators of AHT (Nuño et al., 2015; Starling et al., 1995). This finding is similar to other AHT prevention programs (Barr, Barr et al., 2009; Dias et al., 2017) and aligns with recommendations to find ways to reach male caregivers (Leventhal, Asnes, & Bechtel, 2017; Wood, 2015). The book intervention was also rated as helpful by 93% of caregivers, similar to most AHT prevention programs (77–98%) (Deyo, Skybo, & Carroll, 2008; Dias et al., 2005; Goulet et al., 2009; Morrill, McElaney, Peixotto, VanVleet, & Sege, 2015; Showers, 1992; Stewart et al., 2011).

A unique aspect of this program is its use of an educational baby book to provide anticipatory guidance. Prior studies have found that parents who receive anticipatory guidance through a book are more receptive to the information and perceive the pediatrician as more helpful than parents who do not (Jones et al., 2000). Parents have also been found to have greater knowledge of developmentally appropriate parenting practices (Reich et al., 2010), improved safety practices (Reich et al., 2011), increased adherence

with American Academy of Pediatrics (AAP) safe sleep guidelines (Hutton et al., 2017), and less support for corporal punishment of their infant (Reich et al., 2012) when receiving anticipatory guidance through educational baby books compared to non-educational baby books or no books. This book intervention also helps PCPs meet AAP recommendations of promoting reading with children beginning in infancy (Council on Early Childhood, 2014). Some caregivers stated that the book did encourage them to read with their infant. Use of a baby book may improve comprehension for caregivers with lower literacy as well, although this was not investigated.

Similar to prior AHT prevention efforts (Barr, Rivara et al., 2009; Barr, Barr, et al., 2009; Fujiwara et al., 2012; Morrill et al., 2015; Bechtel et al., 2011), this program demonstrated improvements in caregiver knowledge related to infant crying. **Greater confidence** in their ability to calm themselves during infant crying **was also found** among caregivers who read the book. The All Babies Cry media-based intervention **has shown similar results**, such that caregivers who received the intervention reported using more strategies to manage stress related to infant crying and perceived their strategies as more effective than caregivers who did not (Morrill et al., 2015). A randomized controlled study would be a beneficial next step to provide further evidence and understanding of how this program impacts caregiver knowledge, confidence, and behavior.

This project had limitations. **First, it is unknown why some caregivers did not receive the book, whether or not this impacted survey completion, and whether selection bias played a role. Encouraging provider fidelity with the program is an area of opportunity. Second, the caregiver comments about the book, which serve as the foundation for the thematic analysis, may have been influenced by selection bias or social desirability bias.** Third, the survey questions **have not been validated and** were self-report measures collected after the intervention, not allowing assessment of change over time. Fourth, lack of a control group prevents causal inferences from being made related to program impact, and the comparison groups of caregivers who did not receive or read the book were convenience samples and potentially subject to selection bias as well. Important covariates, including age, gender, and race, were controlled for in analyses, but the differences found could be explained by other variables not investigated in this study. Fifth, the program was implemented within Midwestern pediatric practices and may not be generalizable to other regions or practice settings. Sixth, impact on AHT rates was not measured, as the intervention was not universally distributed in this region.

This project also had important strengths. The intervention was delivered at the 1-month well-child visit, which is proximal to the typical surge in infant crying (Lee et al., 2007), more likely to coincide with caregiver concerns and need for guidance, **and already includes guidance on other parenting practices, such as feeding and sleep. Pediatricians are also considered trusted providers of anticipatory guidance. An educational baby book is an innovative approach for delivering this message, which reached other family members at home, including siblings and fathers, the latter most frequent perpetrators of AHT (Nuño et al., 2015; Starling et al., 1995).** Qualitative methods added useful insights into family attitudes and behaviors. The children's book approach is low-cost, accessible for families of diverse literacy levels, and **could be integrated, scaled, and evaluated as part of existing clinical infrastructure, such as the Reach Out and Read program (Zuckerman & Augustyn, 2011).** Federal and state prevention funding sources could also help cover the cost and distribution of the book to accelerate program expansion and sustainability.

## 5. Conclusion

In summary, Calm Baby Gently is a feasible to implement **and well-received** AHT prevention program **within pediatric primary care.** Caregivers found the book approachable, understandable, validating, and helpful in improving their knowledge and skills related to infant crying. **This book intervention could be combined with other prevention strategies to create a multifaceted approach to reducing AHT. Randomized controlled trials are needed** to better understand **the program's** impact on caregiver knowledge and behavior and AHT rates.

## Declarations of interest

Dr. Hutton is the author and publisher of the children's book involved in this project, though he has not received nor expects to receive royalties or other financial compensation for these roles.

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