



Using the *Baby Moves* smartphone app to perform the General Movements Assessment

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Background

- Cerebral Palsy (CP) is one of the most prevalent physical disabilities in children.²
- Many children are diagnosed with CP after 12 months of life⁴, yet with the use of the Prechtl General Movements Assessment of Infants (GMA), children can be identified as early as 4 months of age at risk for neurodevelopmental delays.^{1,2}
- Early identification of neurodevelopmental disorders leads to appropriate early intervention services and therapeutic outcomes.
- The GMA has a high specificity and high sensitivity for early diagnosis of cerebral palsy¹, yet is hardly used in the United States.

General Movements Assessment¹

- The GMA analyzes two different movement patterns based on amplitude, variability, fluidity, magnitude, complexity, intensity, force, and speed at different age spans of an infant's life:
 - **Writhing Movements:** observed from birth to 6 weeks post term age
 - **Normal:** small-moderate amplitude & speed, variable patterns with rotation
 - **Poor-Repertoire:** movements are monotonous, non-complex
 - **Cramped-Synchronized*:** lack smooth and fluent character; relax and contract together
 - **Chaotic:** large amplitude and intensity with no fluency
 - **Fidgety Movements:** 9-20 weeks post term age (most predictive)
 - **Normal:** small amplitude, moderate speed, multidirectional joint movements
 - **Abnormal:** amplitude, speed, and jerkiness are exaggerated
 - **Absent*:** not present

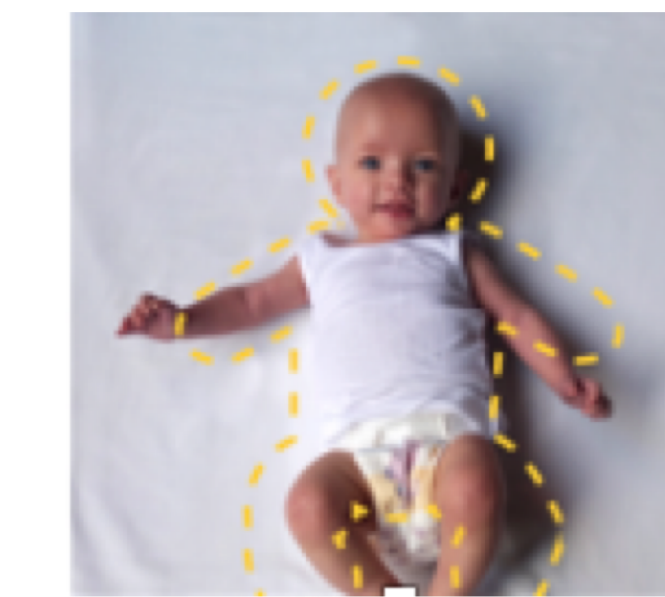
* Indicate the two movement patterns which most commonly represent high risk of cerebral palsy

Baby Moves App

The purpose of our research study is to determine how the use of a smartphone app called *Baby Moves* can help aide in early recognition of motor and postural impairments in infants 9-20 weeks adjusted age while measuring parent satisfaction with its use.

- The *Baby Moves* app is free for registered users and requires use of an Android or iPhone smartphone device.
- Use of the app:
 - Parents record (2) 2-3 minute videos when their baby is between 10-16 weeks old
 - Baby must be:
 - Lying on his/her back with no distractions in view/proper lighting
 - Wearing only a diaper or onesie
 - Awake and moving
 - Happy/content (not crying)
 - No pacifier in his/her mouth
 - No one is talking to the baby
 - Baby's entire body is seen on the video screen
 - Samples of acceptable and unacceptable quality videos for review by a GMA examiner:

Baby Moves App
Easy outline to follow



Acceptable Video



Unacceptable
Baby is crying



Acceptable Video



Unacceptable
Cannot see movements



Current Progress & Challenges

Current Progress

- Institutional Review Board (IRB) approval recently received in order to proceed with our study.
- Recruitment will occur through the Maine Leadership Education in Neurodevelopmental and Disabilities (LEND) program.
- Contract with Murdoch Children's Research Institute in Australia, the owners of the *Baby Moves* app, has been approved by our legal team and is now awaiting final approval by the Australian legal team.
- Created an error journal documenting why the smartphone app is necessary.

Challenges reinforcing the need for the *Baby Moves* smartphone app:

- **REDCap** database, a secure database used by UNE, does not allow for video submission from YouTube links nor file sizes >35MB, which include all iPhone videos of 2-3 minutes.
- **Camtasia** is a software that allows video recording of a video but legality issues arise regarding taking a video of a YouTube video.
- **Thumb Drive:** this would require parents to own a laptop, upload videos onto their computer, and then be able to upload those videos to a thumb drive, which has not proven to be parent-friendly.

Why *Baby Moves*?

In 2016-17, Australian team, AJ Spittle et al. developed the first prospective cohort study using the *Baby Moves* app to aide in successful transmission of movement videos of infants to a remote certified GMA examiner to predict CP and other neurodevelopmental outcomes in extremely preterm (<28 weeks gestation) and extremely low birth weight infants (<1000 g).²

A pilot study performed by Ricci et al. looked at performing the GMA in the US through video recording using a handheld video recording device, but fidgety movements after hospital discharge were more difficult to receive. The results of this research study support the use of the GMA in predicting neurodevelopmental outcomes in infants but noted the need for future research to study successful parent-friendly means of transmission of GMA fidgety videos to a GMA examiner.³

Future Expectations

- We plan to enroll 10-15 parents of infants, aged 10-16 weeks old who meet the following criteria:
 - Born full term
 - Had problems before, during, or after birth
- We will distribute recruitment flyers through the Maine LEND program.
- For those who meet our inclusion criteria, we will meet with parents in their homes and provide the consent form and a tutorial on how to use the app.
- Following successful submission of 2 video submissions via the *Baby Moves* app, parents will be notified of the results of our findings from the GMA examiner within 2 weeks of the last video submission.
- Parents will be asked to complete a short parent survey regarding the ease of use, helpfulness, and satisfaction to assess whether this app allowed for a successful means of fidgety movement video transmission in order to help implement the GMA in the United States.

Contact Information

If you have any questions, please email
Babymoves@une.edu

References

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2. Spittle AJ, Olsen J, Kwong A, et al. The *Baby Moves* prospective cohort study protocol: using a smartphone application with the General Movements Assessment to predict neurodevelopmental outcomes at age 2 years for extremely preterm or extremely low birthweight infants. *BMJ Open* 2016;6: e013446. doi:10.1136/bmjopen-2016-013446
3. Ricci E, Einspieler C, Craig AK. Feasibility of Using the General Movements Assessment of Infants in the United States. *Physical & Occupational Therapy in Pediatrics*. 2018; 38 (3) 269-279. <https://doi.org/10.1080/01942638.2017.1395380>
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Acknowledgements



Murdoch Children's Research Institute owns all rights to the *Baby Moves* app



Maine LEND