Efficacy Trial of the FMF Connect Mobile Health Intervention

Principal Investigators
Christie Petrenko, Ph.D., Mt. Hope Family Center (MHFC), University of Rochester, 187 Edinburgh St., Rochester NY 14618
Cristiano Tapparello, Ph.D., University of Rochester, Computer Studies Building 511, Rochester, NY 14627

1. PURPOSE OF STUDY

This study represents the third phase of a larger research project developed for a U01 award as part of the Collaborative Initiative on Fetal Alcohol Spectrum Disorders (CIFASD) funded by the National Institute on Alcohol Abuse and Alcoholism (NIAAA). The overall project aims to develop and evaluate a mobile health (mHealth) application (app) for parents/caregivers of children with fetal alcohol spectrum disorders (FASD). The primary focus of the FMF Connect app is to provide parent/caregiver education and support.

The first phase of this project was approved under IRB protocol #1266 (legacy RSRB#67394). In that phase we used qualitative research methods to engage parents and caregivers in the development of the mHealth intervention and obtain iterative feedback on acceptability and feasibility. A prototype of the app was developed in both iOS and Android and beta-testing was completed with parents/caregivers and providers. In the second phase of the study, we conducted a feasibility trial of the FMF Connect app with parents/caregivers under IRB protocol #4433. This included quantitative pre-post surveys and qualitative interviews with a subsample of users to optimize the intervention and trial procedures. In this third phase, we will conduct a larger scale randomized controlled trial (RCT) to test the efficacy of the FMF Connect app for parents/caregivers of children with FASD. We hypothesize that participants who receive the FMF Connect app (with or without the additional Coaching Module) will have improve outcomes relative to the waitlist control group. We anticipate the Coaching Module will increase participant engagement and usage of the FMF Connect app. Finally, we hypothesize that parental attributions of behavior targeted by the FMF Connect app will mediate intervention effects on child behavior and parenting self-efficacy.

2. BACKGROUND AND RATIONALE

Children with fetal alcohol spectrum disorders (FASD) have significant neurobehavioral impairments that contribute to poor adaptive function and increased behavior problems in home, school, and community settings [1]. Most interventions for preschool and school-aged children with FASD, the largest age group with identified FASD [2], are directed at caregivers or have included parent training to facilitate child skill acquisition [3]. Interventions directed toward caregivers are an essential component of FASD integrated care models [3,4]. Tailored FASD-informed caregiver interventions provide families with the knowledge and skills to better understand their children's development and behavior, generate effective environmental accommodations and behavior plans, teach and generalize targeted child skills, and advocate for their children in school and community settings [3]. These strategies are vital for sustained child improvement and better family adaptation.

Unfortunately, we and others have documented that the vast majority of families cannot access FASD-informed interventions. Barriers to care occur because a knowledgeable and skilled workforce is lacking [5,6], and there are family-level barriers such as limited financial resources, inability to access childcare, and stigma [7]. Access to appropriate FASD-informed care is even more limited in less densely populated areas. Many families try peer-to-peer and self-help strategies, but it can be difficult to evaluate the credibility and effectiveness of information provided through these modalities.

The primary objective of this project is to develop and evaluate an mHealth app to directly provide caregivers with evidence-based content and peer-moderated support they can easily access and use to improve outcomes for their children and families. The app, called "FMF Connect," is derived from our work on the scientifically-validated Families Moving Forward (FMF) Program that has shown promising results for child and caregiver outcomes in three trials with families raising children with FASD [8]-[10].

This project follows a systematic approach to the development and evaluation of the FMF Connect mHealth intervention. The app is designed for use by caregivers, utilizes a cloud-based infrastructure, and builds on our existing open source framework for the development of medical apps [11], and those of others [12,13]. Feasibility tests and iterative feedback from diverse caregivers have aided in fine tuning caregiver instructions, content, and user-interface features throughout the development process.

The proposed RCT will establish the efficacy of the FMF Connect mHealth intervention in a large-scale efficacy trial. It will also assess the patterns of app usage that relate to the greatest improvements in child and caregiver outcomes and test whether text-based coaching increases engagement with the app. Consistent with prior FMF trials, targeted outcomes include satisfaction, child behavior problems, caregiver FASD/advocacy knowledge, attributions of misbehavior, parenting practices, parenting efficacy, self-care, and social support. This novel mHealth intervention has the potential to reach many families in need and reduce significant barriers to care, resulting in broader public health impact.

3. ADMINISTRATIVE ORGANIZATION

This study will be conducted through the University of Rochester (UR) and will involve faculty, students, and staff within the following departments and centers: Department of Psychology, Mt. Hope Family Center (MHFC; which is a part of the Psychology Department), Department of Electrical and Computer Engineering (ECE). Dr. Petrenko's primary appointment is at MHFC and the Psychology Department. She oversees the study coordinator, research assistant, and graduate and undergraduate students working on the project within these departments. Dr. Tapparello is faculty within ECE and oversees staff and students within these departments contributing to the project. Weekly project lab meetings ensure coordination across all aspects of the project.

All data collection and communication with participants is completed by UR project staff. Consenting and screening data, contact information, and quantitative survey pre-post data will be collected and stored online using REDCap hosted by UR. Participant interaction with the app is recorded using Amazon Web Services (AWS; HIPAA-Compliant). All paper and electronic files will be securely stored on MHFC servers and in locked cabinets only accessible to UR project staff.

As part of CIFASD, this study may involve data sharing as outlined by the policies and procedures established by CIFASD and required by NIAAA: https://cifasd.org/data-sharing/. De-identified data will also be stored in the CIFASD Central Repository hosted at Indiana University (IU), as is required by NIAAA for all projects involved in CIFASD.

4. STUDY DESIGN

This study involves a three arm RCT with equal allocation to the following conditions: (1) FMF Connect + coaching, (2) FMF Connect alone, and (3) waitlist control. Quantitative survey data will be collected at three timepoints: baseline (T1), 6-weeks (T2), and 12-weeks (T3). The T2 timepoint will involve an abbreviated battery designed to allow statistical tests of mediation hypotheses (see Data Analysis Plan below). Primary study outcomes include child behavior, parent FASD knowledge,

parenting self-efficacy, behavior attributions, family needs met, and parent use of self-care. We are also interested in participant ratings of app quality and patterns of app usage. App usage will be recorded through AWS during the study period. After T3, study participants in the waitlist control group will receive the FMF Connect app.

5. SUBJECT POPULATION

The subject population will include parents and caregivers of children (ages 3-12) with fetal alcohol spectrum disorders (FASD) or affected by prenatal alcohol exposure (PAE) who live in the United States.

We are aiming to include 150 parents or caregivers with usable data in this study to achieve adequate power for study aims (see data analysis section below). We expect a portion of families will enroll in the study, but not complete assessments or install the app. Based on our feasibility trial, 57% of participants who initiated screening were eligible for the study and had complete data. This percentage may be a bit lower than we can achieve for the proposed RCT given that the COVID-19 pandemic began right after the initiation of the feasibility trial and affected participation. We also identified some inefficiencies in our enrollment process that we can improve to reduce incomplete data. Of eligible families selected for the study, we expect about 85% of eligible families to complete baseline surveys. Of these families, about 80% are likely to install and use the app at least once. To attain our desired sample size, we will aim to enroll about 300 parents and caregivers.

6. INCLUSION AND EXCLUSION CRITERIA

Inclusion criteria:

- Biological parent or other primary caregiver (e.g., foster or adoptive parent, relative, legal guardian) of a child with FASD or PAE
- The parent/caregiver must be at least 18 years old
- The child must between the ages of 3 and 12 years old (if there is more than one child in the family with FASD/PAE in this age range, the parent/caregiver is instructed during screening to choose one to complete study surveys about)
- The child has a diagnosis of FASD or has confirmed PAE
- The child has lived with the parent/caregiver for at least 4 months and is expected to remain in the home for at least 1 year
- The parent/caregiver lives in the United States
- The parent/caregiver has a smartphone or ipad with iOS operating system

Exclusion criteria:

- The parent/caregiver is not fluent in English (the FMF Connect app and pre-post measures are currently only available in English)
- There is another parent/caregiver of the same child or living in the home that is already enrolled in the study (couples are excluded to prevent dependence in the data)
- The parent/caregiver participated in a prior trial of the FMF Connect app as part of phase 1 or 2 of this project.
- The family has previously received or is currently receiving the therapist-led Families Moving Forward (FMF) Program

7. RECRUITMENT METHODS

Potential participants will be recruited through a variety of mechanisms, consistent with previous studies in our research group and in CIFASD. The Study Website will include information about the study, as well as a link to the study REDCap Consenting and Screening Module for interested families to enroll.

The following materials have been developed to aid with recruitment: (1) study flyers, (2) social media banners formatted for Facebook, Twitter, and Instagram, and (3) powerpoint slide. Information about the study will be disseminated in various ways:

- Dr. Petrenko will share study recruitment materials with providers and community advocates who regularly see children with FASD
- We will post study information on our study Twitter account (@FMFConnect) and newsletter (www.fmfconnect.com)
- CIFASD investigators can inform research participants or patients in their local sites or clinics for which they have routine access
- The National Organization on Fetal Alcohol Syndrome (NOFAS) is a member of CIFASD and has a mission to educate the public about FASD and disseminate research and policy information. They can disseminate the study flyer through their Weekly Round-Up newsletter, significant social media presence, and to their state and local affiliates who can share in their communities
- Dr. Petrenko and other CIFASD investigators may include slides about the study in conference or community presentations
- Organizers/moderators of popular social media groups can be sent recruitment materials and can choose to share with their members

As part of CIFASD, we will also try to aid other projects with recruitment from our study sample. Our Consenting and Screening Module includes a question asking if participants are interested in learning about other studies. For those that indicate yes, we will send them any new relevant flyers or information about other consortium projects they might be eligible for. We will submit any flyers and email language in a modification to this study prior to sending to our participants. For example, the DiG Human Genetics Study within CIFASD has previously referred some families to our study. We would like to send their study flyers (see attached flyer and email language) to participants in our sample who indicated they have not previously done the DiG study (in Screening Module).

8. CONSENT PROCESS

Interested parents/caregivers will go to the Study Website to begin the informed consent process. On the Study Website they will select the link that they are interested in participating. This link will take them to the study REDCap Consenting and Screening Module, hosted at UR. Interested participants will have the option to review study consent information by video or text. They are also told they can contact the study team by phone or email to complete the consent process over the phone/video chat if they prefer (the research team would send them the consent and then go over it by phone/HIPAA-compliant video chat; participant would return signed copy).

- **Text option**: the text of the Consent document will be presented on the screen for potential participants to read. The Consent document will include the HIPAA authorization.
- **Video option**: the animated video reviews key details from the Consent document. The HIPAA authorization, and information about email and texting the research team are presented following the video in text.

For either option, participants will need to answer several questions about the study to ensure comprehension. Participants will also be asked to indicate if they have questions and space will be provided for them to type in any questions they have. If the participant selects "yes" they have questions, they will be informed the study coordinator will contact them before they proceed. The study coordinator's contact information will also be presented if participants want to contact the coordinator with questions while reading the document. The study coordinator will document contact in the study contact log in REDCap.

If they don't have questions or the coordinator has addressed them, participants can sign the consent form by utilizing REDCap's signature field. Questions asking for first and last name and date of birth are included as extra documentation of the participant's identity. The participant will then select "Next Page" and a read only copy of the consent will be generated that they can review, download, and/or print. At the bottom of the page they will need to select "I certify that all the information in the document above is correct, and I understand that signing this form electronically is the equivalent of signing a physical document." Once this is selected they will be able to submit the signed consent form.

Upon completion of the consent survey, a static copy of their responses in the form of a consent-specific PDF will be stored in the project's File Repository in REDCap (to allow for versioning). The e-Consent Framework in REDCap also records the IP address of the participant and displays this information in the file repository in order to help regulate potential duplicate forms from a single IP address. A PDF file of the completed consent form will be available for download by the user. The PDF can also be emailed to participants or printed/sent to participants in the mail on request if they are unable to open or save a copy electronically on their device.

After completing the consent document, participants will be directed in REDCap to answer screening questions to assess eligibility for the study (see Screening Form). If eligibility criteria clearly aren't met (e.g., out of age range, outside the US, no smartphone, etc), parents/caregivers will be informed immediately that they aren't eligible and the module will end. For parents/caregivers who appear to meet criteria or in cases where parents/caregivers answer "unsure" for any of the questions, contact information will then be gathered. Contact information will also include necessary variables to generate their "globally unique identifier" (GUID), which is used in other CIFASD studies (https://nda.nih.gov/s/guid/nda-guid.html).

Common variables are used across several CIFASD studies. We have adapted and streamlined several CIFASD Common Forms for the purposes of this study, which will be administered next in REDCap. These forms include: the Parent Demographic Form, the Child Demographic Form, the Prenatal Exposure History, and the FASD Diagnosis History forms. These forms take about 15 minutes or less to complete in total. After completing the Consenting and Screening module, participants will be notified that project staff will review all submitted information to assess final eligibility.

Participant completion of the study consent document also triggers an automatic notification to the study coordinator, who will log-in to REDCap and review the consent. She will then add her name and date to the eConsent document. However, the date study staff sign the eConsent may differ from that of the participant; for example, if the participant completes the forms on a weekend. The coordinator will also document the date of this review in the study database and download a copy of the consent form to maintain in study records. Next the coordinator will review screening responses and demographic variables to assess eligibility and will document this in the study database. See next section.

This study is funded by the National Institute of Health (NIH). A Certificate of Confidentiality is automatically included as part of the notice of award. Language regarding the Certificate of Confidentiality is included in the consent form.

9. STUDY PROCEDURES

Data Collection & Randomization Procedures

Parents/caregivers who are eligible for the study will be sent an email inviting them to complete the baseline study surveys (see survey battery below) administered by REDCap. Participants will be

asked to enter their zip code to verify their identity when completing baseline and follow-up surveys (this will be verified against value entered in demographic surveys in the screening module). Families deemed ineligible after detailed review will be informed of their status.

Following baseline survey completion, participants will be randomized to one of three arms of the RCT:

1. FMF Connect app + text based coaching (within the app)
2. FMF Connect app (without coaching)
3. Waitlist control

Randomization will occur through the REDCap Randomization module, with an equal allocation pattern across groups. Participants will be notified of their group status via email. Emails for parents/caregivers in either of the FMF Connect app intervention groups (groups 1 and 2) will also include instructions of how to install the FMF Connect app on their devices. The email for the parents/caregivers in the FMF Connect app + coaching group (group 1) will inform them that they will receive an introductory email from their assigned coach in the next few days. Details about the FMF Connect app and Coaching interventions and described below.

All participants regardless of group assignment will receive emails through REDCap at 6 weeks and 12 weeks inviting them to complete follow-up surveys, along with a personalized link (see survey battery below). The assessment battery is estimated to take 35-45 minutes to complete at T1 and T3; T2 is estimated at 15-20 min. Waitlist control participants will receive the FMF Connect app following T3 survey completion.

Table 1. Study Assessment Battery

Measure	Baseline (T1)	6-Weeks (T2)	12-Weeks (T3)
Eyberg Child Behavior Inventory (5-8min)	X		X
Reasons for Children's Behavior Scale (4-6min)	X	X	X
Everyday Life Scale (4-6min)	X	X	X
Parenting Sense of Competence Scale (3-5min)	X	X	X
Family Needs Questionnaire (3-5min)	X		X
Knowledge & Advocacy Questionnaire (15-20min)	X		X
Self-Care and Support Assessment (3-5min)	X		X
Adverse Childhood Experiences (2 min)	X		
Family Background & Services Survey (5-10min)	X		X
COVID-19 Experiences Survey (5 min)			X
User Version of the Mobile Health Application Rating Scale (5-8min)			X

FMF Connect mHealth Intervention

The FMF Connect intervention includes cloud infrastructure and an innovative, multilayered mobile app. It incorporates tailored content for parents/caregivers of children (ages 3-12) with FASD or PAE. The app integrates five main components: 1) Dashboard; 2) Learning Modules; 3) Family Forum; 4) Library; and 5) Notebook. Weekly emails are also sent to support motivational engagement.

App education, derived from the standard FMF Program, is packaged in easily digestible Learning Modules. The Learning Modules are organized into three levels: 1) Getting Started; 2) Taking Action; and 3) Taking It to the Next Level. The Library provides access to additional optional content that can be downloaded and printed to use in advocacy and skill development. The Notebook is a personalized section that organizes parents'/caregivers' responses to learning activities in a convenient location for

later easy access.

The Family Forum serves to 1) engage and facilitate parents'/caregivers' continued utilization of the app, 2) support and extend parents'/caregivers' implementation of new knowledge and skills, and 3) provides peer support, encouragement, and understanding of the parent's/caregiver's own needs. Trained peer moderators will moderate discussion in family forums to ensure safety. They will also provide support and prompt skills or content areas to consider.

The Dashboard displays parent/caregiver progress in Learning Module completion, use of the Family Forum, and daily and weekly ratings imputed by the parent/caregiver. It also includes the Tip of the Day feature.

Complementing the app is a Cloud infrastructure to transparently but securely distribute information, including storing and retrieving data, managing notification and messaging, and synchronizing data on all devices. A local datastore will protect the mobile app against network failures and connectivity issues. This local datastore will be transparently synchronized with the Cloud database so that all the querying and security features will be always available regardless of network connectivity. Updates will be automatically pushed out so users have the latest version.

The primary purpose of FMF Connect is to provide parent/caregiver education and support. It does not meet the FDA's definition of a medical device; it is not aiming to cure, treat, mitigate, or prevent FASD and is most similar to apps within the General Wellness category.

Coaching Module

On average, about 25% of apps are only used once after download [14], and only 29% of app users were still using an app 90 days after download [15]. A Coaching Module has been developed within the FMF Connect app to help engage parents/caregivers and support continued use and individualized goal setting within the app.

The Coaching Module will be activated for parents/caregivers in the FMF Connect + Coaching group only. This Module will allow their assigned coach to exchange text-based messages through the FMF Connect app's notification system with them. Coaches will have access to a dashboard of their participants' progress and use of the app, which will aid in tailoring messages and supporting parents in their identified goals. The Coach's interface also provides a secure way to provide text-based messages to the participant within the app.

Coaches include research staff and graduate students on the project who are familiar with the FMF Program principles and are knowledgeable about FMF Connect content and features. They have training in motivational interviewing (MI), which is a key therapeutic technique used in the FMF Program. Coaches will use the spirit and skills of MI to elicit the participant's own motivation to learn more about FASD and skills taught in FMF Connect. They will help align the parent's/caregiver's own values and goals with the content and features within FMF Connect.

10. RISKS TO SUBJECTS

Risks to Subjects

Participants may experience psychological risks associated with participation in this study, such as discomfort or boredom in answering questions or providing feedback about the app. Psychological discomfort is also possible during interactions between participants as part of the Family Forum of the FMF Connect app. This potential risk of discomfort is expected to be similar to other social media use.

There is also a risk of loss of confidentiality. All data collected for the proposed research study will be kept confidential to the extent allowed by law. Although it is unlikely given the nature of this study, if participants disclose that someone is being maltreated or is a danger to self or others, research staff will need to break confidentiality to make a report to the appropriate authority to ensure safety, as mandated by law. The Coaches and Peer Moderators in the Family Form will be trained to promptly alert Dr. Petrenko if there are concerns about a participant or their family's well-being so she can take appropriate steps, which may include alerting outside authorities to ensure safety. It is also possible that other parents/caregivers in the Family Forum might disclose personal information about other participants who post in the Forum to people outside of the research studies. We believe that all identified risks are reasonable given the proposed procedures for protecting against risk.

Protections Against Risks

To minimize risk associated with psychological discomfort, participants will be given the option to skip questions they feel uncomfortable answering. The Peer Moderators in Family Forum will be trained in creating a welcoming, nonjudgmental, and supportive environment for all participants. Clear rules and expectations will be delineated for the Peer Moderators and participants. Participants will be notified of these rules and expectations upon receiving the FMF Connect app and will be reminded throughout their participation. Any violations of these rules and expectations will be addressed by the Peer Moderators (e.g., removing posts, alerting Dr. Petrenko). These violations will also be reviewed by Dr. Petrenko during supervision with the Peer Moderators. Participants will also have the ability to send an email to project staff if they experience discomfort during their participation in the Family Forum. Appropriate actions will be taken under Dr. Petrenko's supervision to address discomfort and participant well-being and safety. Participants can also choose to not enter or post in the Family Forum if they do not feel comfortable or are not interested in this component.

Multiple procedures will be implemented to protect participant confidentiality. In terms of data storage and management, any hard copy data will be secured in locked file cabinets within locked offices, available only to program staff. Electronic data will be stored in secured servers, and only program staff with knowledge of the password will be able to access the data. Forms with identifying information will be separated from the data collected and only subject numbers will be retained in data analysis files.

Multiple levels of protection will be put in place to reduce the risk of loss of confidentiality for data collected through the app. A local datastore will protect the mobile application against network failures and connectivity issues. This local datastore will be transparently synchronized with the Cloud database so that all the querying and security features will be always available regardless of network connectivity. Collected data will be stored using a random code that will not allow direct identification of a particular subject, while any data that identify the user will be stored separately. All the connections between the mHealth app and the Cloud, as well as access and storage to the Cloud database, will use state of the art authentication and encryption algorithms (e.g., HTTS, SSL and TLS). These were built and are managed by Dr. Tapparello. As a result, users will be able to add and modify their own data but will be prevented from viewing and modifying other users' data. FMF Connect will also not alter the security settings of the user's phone, access stored information in the phone, or access device functionalities without explicit user consent. A passcode (or touch ID/Face ID) will be required to access the content of the FMF Connect app, and all the personal data stored by the app will be encrypted automatically whenever the device is locked.

All information obtained for research will be kept strictly confidential (as allowed by law) by research staff. Participants will be told about all exceptions (e.g., child/dependent adult abuse, harm

to self or others) to confidentiality during the consent process. Project staff (which includes Coaches) and the Peer Moderators will be closely supervised by Dr. Petrenko and instructed on confidentiality, including what information is confidential, the limits of confidentiality, and to whom to report concerns. If maltreatment is suspected, staff will first discuss their concerns with the caregiver and inform him/her that, as indicated in the consent form that she/he had previously signed, our staff are ethically and legally obligated to file a report with Child Protective Services. We have found that this approach conveys respect for the family and mitigates parental anger that might otherwise emanate from filing a report. In our experience, when situations requiring filing a maltreatment report are handled sensitively and framed as stemming from concern for the welfare of the entire family, caregivers often perceive the process as being helpful to them.

Finally, while it is not possible to control what participants do outside of group settings (e.g., Family Forum), we will thoroughly explain the concept and importance of confidentiality and give real life examples of what is appropriate and inappropriate to discuss with people outside of the project. The Peer Moderators will emphasize the importance of confidentiality and will monitor and remind families of this rule and expectation. Privacy settings within the Family Forum will balance participant confidentiality and caregiver preferences. All caregivers will be assigned a unique username to log into the app. They will also be able to select their own username that will show up in the Family Forum. These usernames will be separate from their research participant ID numbers. Participants will be informed of the risks to confidentiality at the outset of the study and will be provided with reminders. Caregivers will have the ability to choose how much information to share about themselves and their experiences in the Family Forum. No other data from other app components will be shared in the Forum, unless the caregiver independently and voluntarily elects to do so.

The FMF Connect intervention is viewed as a "value-added" intervention. Participants can continue to receive care as usual in their community. The alternative to participating in this study is not to participate.

11. POTENTIAL BENEFITS TO SUBJECTS

Parents and caregivers may not experience any direct benefits from participating in this study. However, participants in prior FASD research studies at MHFC have commented on how they value and derive personal satisfaction in participating in research to increase knowledge about this under-recognized condition and effective strategies to benefit other children and families. It is also possible, although not guaranteed, that participants might derive benefit from receiving the FMF Connect program. Possible benefits may include increased knowledge about FASD and parenting strategies or social support from other caregivers.

12. COSTS FOR PARTICIPATION

There are no costs to participate.

13. PAYMENT FOR PARTICIPATION

Eligible parents/caregivers will receive a reloadable gift card associated with the Advarra system. They will receive $40 on the gift card for completing T1 and T3 surveys, and a $20 for completing the briefer T2 surveys.

14. SUBJECT WITHDRAWALS

Subjects will be advised during the consent process that they have the right to withdraw from the study at any time without prejudice. They can choose to use the app as much as they want (or not at all). We are interested in obtaining survey data as well as feedback about the user experience from as many participants as possible, including those who chose not to use the app or found it hard to

navigate. This information is useful in identifying ways to improve the app and facilitate user engagement. Subjects can choose not to complete any or all of the study assessments. They can also completely withdraw from the study with no future contact if they choose. In this case, any data they have previously provided may be used in analyses.

15. PRIVACY AND CONFIDENTIALITY OF SUBJECTS AND RESEARCH DATA

All data will be used solely for research purposes and will be securely locked in designated file cabinets, secure data servers at MHFC, Project REDCap database, and an encrypted, HIPAA-complaint Cloud database (for data collected via the app; see above). Identifying information will be stored separately from other data, which will be stored by research ID number. Multiple procedures will be implemented to protect participant data collected through the app, which are further detailed in the section "Protections Against Risks." Only senior key personnel and project research staff will have access to the data.

Consistent with the mission of CIFASD, the CIFASD Data Repository allows for data sharing for internal CIFASD investigators across projects as well approved external investigators. A CIFASD Data Sharing Policy has been established and is available on the CIFASD website: https://cifasd.org/data-sharing/. External investigators need to submit a CIFASD Data Access Request Form, CIFASD Data Use Agreement, and provide documentation of IRB approval.

17. DATA / SAMPLE STORAGE FOR FUTURE USE

As a CIFASD project, de-identified data from this project will be stored indefinitely in the CIFASD Central Repository, as required by CIFASD and NIAAA. The Central Repository is hosted and managed at Indiana University. Policies and procedures associated with the CIFASD Central repository are described in the prior section. Also, since data are associated with a GUID they can be aggregated with other studies with overlapping participants.

All data (de-identified and identifying) will be securely stored locally for an indefinite period. De-identified and identifying information will be stored separately as detailed above. Novel research questions may arise in the future that this important dataset could answer. Future studies may also be interested in long-term follow-up of families who participated in this research. Retaining identifying information would facilitate contacting families (subsequent to new IRB approval) to see if they would be interested in participating in follow-up research. MHFC has well-established data security procedures in place for long-term storage and maintenance of data. Only approved project staff will have access to data.

18. DATA AND SAFETY MONITORING PLAN

Because the research involves the provision of a mobile health parenting intervention for parents and caregivers, the risk for a serious adverse event due to provision of the intervention is low. Adverse events that could occur in children with FASD or their parents/caregivers could include aggression or violence towards others, maltreatment, self-harm or suicidality, or the need for inpatient hospitalization. However, these occurrences are unlikely to be a direct consequence of participation in the proposed research or interventions.

Dr. Petrenko will assume ultimate responsibility for the safety and well-being of research participants and the integrity of data collected. Dr. Petrenko has conducted several RCTs pilot feasibility studies with children and teens with FASD and their families. She is a licensed psychologist in the state of New York and is involved in other clinical and research activities at MHFC where maltreatment and suicidality are commonly reported.

The well-being of participants will be monitored throughout the course of the proposed research. If there are concerns regarding a participant during interactions with research staff, staff will immediately contact Dr. Petrenko for consultation and a plan will be developed to address the concerns raised.

Coaches and Peer Moderators will be trained to contact Dr. Petrenko immediately about any significant concerns that arise during their interactions with participants in the app. Additionally, because MHFC provides other treatment programs, there are other back-up clinical supervisors available for consultation for immediate needs. A phone tree will be established, similar to other projects at MHFC, and will be provided to Coaches and Peer Moderators. Dr. Petrenko will meet with Coaches weekly to provide supervision and will assess participant well-being. Dr. Petrenko will also provide supervision to Peer Moderators; the frequency of these meetings will depend on the activity level with the Family Forum (during prior beta-test and feasibility trials some weeks had only a few new posts), but will occur at minimum every 3 weeks. Dr. Petrenko will consult with other co-Investigators and clinical staff at MHFC, as appropriate, to address participant well-being concerns.

An independent safety monitoring board has also been established for the larger project, consisting of researchers and clinicians with relevant expertise with at-risk populations, clinical trial monitoring, and human subjects protections and technology. ISM members and their areas of expertise are listed in the following table:

Name	**Title & Affiliation**	**Relevant Areas of Expertise & Experience**
Sheree Toth, Ph.D.	Director & Professor, Mt. Hope Family Center, University of Rochester	Clinical psychologist; developmental psychopathology; relational interventions; maternal depression; maltreatment; prevention of teen depression; has conducted multiple large-scale intervention trials with high-risk populations.
Lynn Cole, M.S. PNP	Clinical Director, Kirch Developmental Services Center, Neurodevelopmental and Behavioral Pediatrics, University of Rochester Medical Center	Pediatric nurse practitioner; physical and mental health of children with developmental disabilities; intellectual disability, FASD, autism, and cerebral palsy.
Anthony Pisani, Ph.D.	Associate Professor in Psychiatry and Pediatrics, Center for the Study and Prevention of Suicide, University of Rochester Medical Center	Clinical psychologist; suicide prevention; public health messaging; safe and ethical use of technology in prevention science

The ISM committee will review and suggest modifications to research protocols and consent documents to assure scientific integrity and adherence to human subjects' protection policies. They will meet with the PI and co-Investigators twice a year to monitor safety issues and provide feedback on scientific and ethical issues relating to project implementation. The IRB will be notified immediately of any adverse events via telephone and submission of a "University of Rochester Serious Adverse Event Report". Such events would also be reported to NIAAA. The proximity of committee members will also facilitate their ability to monitor data management activities. The committee may ask to review data for quality control purposes.

Ethically, we are committed to ensuring the welfare of children and their families. Any significant mental health or safety issues detected during the conduct of this investigation will be discussed with participants and options for the receipt of services presented. The FMF Connect app will also contain a module with links for mental health and crisis resources, as an additional safeguard. A safety message will also be included in the app to direct caregivers to call 9-1-1 or other local crisis services in the event of an emergency.

19. DATA ANALYSIS PLAN

Aim 1: For the two intervention groups, compare patterns of app usage (i.e., frequency, duration, use of core components) that relate to greater improvements in child and caregiver outcomes. Assess whether FMF Connect + Coaching results in higher usage of the app relative to FMF Connect alone.

A series of Multiple Regression analyses will test how app usage (i.e., frequency, duration, content/components accessed) relates to change in outcomes (i.e., parenting efficacy, FASD knowledge, family needs, child behavior) over time, controlling for pre-intervention level of functioning. With a sample size of 100 (n=50 per intervention group) and assuming $\alpha = .05$, there will be power .80 to detect small/medium effects (f^2=.10), .94 to detect medium effects (f^2=.15), and power > .99 to detect large effects (f^2=.35).

Aim 2: Examine whether families randomized to the three study arms differ in outcomes.

Repeated Measures Analysis of Variance will test whether families randomized to FMF Connect groups demonstrate improved outcomes relative to the waitlist group at 12 weeks. Pairwise comparisons will test for differences among intervention groups to determine if coaching adds additional benefit. Assuming a correlation among repeated measures ranging from .3 to .5 ($\alpha = .05$), with a sample of 150 and 3 time points, there will be power between .87-.96 to detect a small/medium effect (f=.175) and >.99 to detect medium and large effects (f=.25 and f=.40).

Aim 3: Examine whether parental attributions of child misbehavior mediate intervention-related changes in parenting efficacy and child behavior.

Mediation analyses will test whether parental attribution mediates the effects of FMF Connect on parenting efficacy and child behavior, including baseline levels of the respective outcomes. Given a sample size of 150, there will be adequate power (>.80) to detect small/medium effects within the mediation models using the bias-corrected bootstrap method.

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