PROTOCOL TITLE:

An investigation of a parent/child psycho-social computerized intervention targeting the error-related negativity in young children

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REVISION HISTORY

Revision #	Version Date	Summary of Changes	Consent Change?
2	10/23/2019	Transferring protocol to RAMP	no
3	12/6/2019	Adding mailing list, interviews, self-report measures, etc.	yes
4	2/17/2020	Adding self-report measures, changing demographic questionnaire, removing $40 incentive for between-session module completion	yes
5	6/19/2020	Addition of COVID-19 procedures	yes

Table of Contents

1.0 Study Summary

Study Title	An investigation of a parent/child psycho-social computerized intervention targeting the error-related negativity in young children
Study Design	This is a 5-year training grant wherein during the 1st year of the award, PI, Dr. Alexandria Meyer, will develop a novel computerized intervention for parents and children that aims to reduce over-reactivity to making mistakes.
Primary Objective	Reduce over-reactivity to making mistakes in children.
Secondary Objective(s)	
Research Intervention(s)	A novel computerized intervention for parents and children that aims to reduce over-reactivity to making mistakes.
Study Population	175 parent/child dyads with children between the ages of 5 and 7 years-old
Sample Size	175 parent/child dyads
Study Duration for individual participants	6 months
Study Specific Abbreviations/ Definitions	ERN = error-related negativity

2.0 Objectives*

2.1 **AIM 1**: Assess initial target engagement by examining whether a neural marker of risk for anxiety (i.e., the ERN) in children is decreased during a single lab visit, via a brief, computerized intervention designed to target error sensitivity. We hypothesize that children who receive the intervention will display a decrease in the ERN at the first assessment, compared to children in the control condition. 1a. Assess alternate measures of target engagement. Self-report and observational measures of error sensitivity will also be decreased for parents and children who receive parent and child active interventions, respectively. **AIM 2**: Examine whether children in the intervention conditions display a reduction in the ERN from the initial lab assessment to the six-month follow-up assessment. We expect that children in all treatment conditions (parent/child, parent only, child only) will display a reduced ERN compared to the control group. 2a. Dissociate the impact of parent/child, parent only, versus child only treatment conditions. We hypothesize that children in the combined treatment group (parent/child) will have the greatest reduction in the ERN. 2b. Examine the impact of utilization. We expect that parents and children who utilize the treatment materials more frequently will experience the greatest reduction in the ERN. 2c. Assess alternate measures of target engagement. We will also examine all hypotheses in relation to self-report and observed measures of parent and child error sensitivity. **AIM 3:** Examine whether parent/child dyads in the intervention conditions experience changes in anxiety symptoms at the six-month follow-up. We hypothesize that the dyads in the intervention conditions will experience greater changes in anxiety symptoms compared to the control group. We will also compare conditions, as well as examine the impact of utilization. In exploratory analyses, we will examine to what extent changes in the ERN and error-sensitivity relate to changes in anxiety symptoms in children.

3.0 Background*

3.1 Anxiety disorders are the most common form of psychopathology, and are associated with substantial impairment. Longitudinal-prospective work demonstrates that anxiety disorders often begin in childhood and persist across the lifespan. Therefore, there is a critical need and opportunity to identify markers of risk that predict anxious trajectories of development. Markers that are evident before symptoms become impairing may be novel targets for intervention. One promising biomarker of anxiety is increased brain activity in response to errors, as reflected by the error-related negativity (ERN). The ERN is a deflection in the event-related potential (ERP) occurring after an individual makes a mistake on

lab-based tasks. In over 45 studies to date, the ERN has been found to be increased in anxious individuals, including children as young as age. Critically, an increased ERN has also been shown to predict the onset of new anxiety disorders in children and adolescents, even while controlling for baseline anxiety symptoms and other known risk factors.

Considering the ERN is elevated before anxiety symptoms become impairing, it is crucial to identify factors that may modify the ERN early in life – and determine if doing so can prevent the onset of clinical anxiety. Given that the ERN can be potentiated in the lab by punishment for errors8, we hypothesized that exposure to critical parenting styles may sensitize children to their own mistakes. Indeed, we found that both observational and self-report measures of critical parenting style related to an increased ERN in offspring in a large sample of young children. This finding has since been replicated in even younger children (approximately 4 years old), suggesting that the ERN is a neural risk marker for anxiety that can be shaped by parenting behaviors. This raises the possibility that the ERN might also be modified by targeting specific parenting behaviors, and thus, may be a modifiable biomarker. However, no previous work has examined whether modifying parenting can impact the ERN. Moreover, no previous work has examined the extent to which any targeted intervention may impact the ERN in children.

3.2 In my lab, we have recently collected pilot data suggesting that the ERN can be reduced in children undergoing a brief, computerized, psychosocial intervention targeting reactivity to making mistakes. Drawing upon this and other work, in the current proposal, we will develop a novel psychosocial intervention that targets over-reactivity to children's errors, which can be administered to parents and children, or both, which aims to reduce the ERN in children.

3.3 The proposed Mentored Career Development Award (K01) is designed to extend my previous work on the ERN, parenting, and risk for anxiety in young children to test the extent to which the ERN can be modulated. Specifically, we will recruit 175 parent/child dyads, high in error sensitivity, and randomize them to a parent/child treatment condition, parent only treatment condition, child only treatment condition, or control condition. We will measure the ERN in children pre and post intervention. Parents and children in active conditions will have access to additional online materials between the baseline and follow-up visit. At a six-month follow-up, we will again assess children's ERN, error sensitivity, and anxiety symptoms. My training plan builds on my expertise on the ERN and anxiety, and integrates training in the design and implementation of computerized interventions, as well as advanced statistical analyses related to intervention outcomes.

4.0 Study Endpoints*

4.1 Participants will come into the lab for a baseline visit and return to the lab 6 months later for a follow-up visit.

5.0 Study Intervention

1.1 Description: As part of the current proposal, during Year 1, we plan to develop a computerized intervention to be administered to parents and children separately. All participants in an active condition (parent/child, parent only, or child only) will receive the initial treatment session in the baseline lab visit. Additional materials that expand upon the concepts presented in the 1st session will be available online for children and parents between the baseline and follow-up assessment (depending on condition, e.g., in parent only condition, only parents will have access to between-session materials). These materials will include worksheets, games, and handouts. Participants will be told that participation in these additional online modules is optional and we will send a weekly reminder (via email or text) to remind them of concepts from the initial session, as well as provide the links to the additional materials. We will track utilization of the additional materials in parents and children. Additionally, as part of these additional modules, we will periodically ask parents and children to complete the Error Sensitivity Index to track changes across the 6 months between lab assessments. The development of this intervention, and testing its impact on ERN, is the primary goal of the proposed training grant. Dr. Brad Schmidt is an expert in the area of computerized treatments for anxiety and will aid in the development and implementation of the intervention. Additionally, Drs. Rapee, Cougle, Comer, and Chronis-Tuscano all have expertise in intervention development and I will consult with them regularly during the development phase of the training grant. For the child intervention, we will use developmentally appropriate language, as well as stories that children between the ages of 5 and 7 can understand and relate to. We will train research assistants to guide children through the computer intervention and answer questions when children appear to be confused. We used this approach successfully when administering the Child Error Sensitivity Index to children between the ages of 5 and 7 years-old, as well as during pilot data collection. This intervention will be based on the constructs in the Child Error Sensitivity Index, as well as other constructs, that relate to the ERN – for example, perfectionism, fear of evaluation from others, and over-valuation of the negative consequences of errors. The intervention will focus on basic concepts such as: “making mistakes is how we learn new things”, “everybody makes mistakes”, and “good things come from mistakes.” While the first session will focus primarily on constructs in the Child Error Sensitivity Index, the additional online materials will expand beyond this. For example, we will cover other constructs that may also relate to the ERN: e.g., tolerance of uncertainty, distress tolerance, mindfulness, constructive self-talk, facing fears, identifying sensations of anxiety, avoidance, behavioral inhibition, checking behavior, etc. – all in the context of, or relating to, performance monitoring or error sensitivity. The intervention will be

interactive, including games and recorded vignettes, as well as questions to gage children's comprehension of the concepts being presented. To collect pilot data, we created a very preliminary version of this computerized intervention to collect pilot data in young children. This preliminary intervention can be viewed at: https://www.youtube.com/watch?v=1wUNqdQ91Io&t=10s.

The parent version of the intervention will include these same basic concepts, but will also target parenting style and provide psychoeducation on the negative impact of over-reacting to children's mistakes. The parent version will also include examples of how to model appropriate reactivity to mistakes, and provide video vignettes and examples of both critical and adaptive parenting reactions to mistakes. The parent intervention will also provide feedback to the parent on how reactive they tend to be to their children's errors and provide a structured way for parents to plan to reduce their reactivity to their children's mistakes. For example, planning positive reinforcement strategies and how to avoid criticality in specific situations. We will also explore various motivations that parents may have for hyper-reactivity to children's errors (for example, the motivation to punish errors vs. preventing the child from failing and experiencing negative emotions) and discuss ways to increase awareness of these motivations, as well as the negative consequences of this behavior on children. Additionally, we will offer replacement behaviors, as well as examples of how to integrate these new behaviors into daily activities. Both interventions will be designed to last approximately 45 minutes. The format of the interventions will be based on Dr. Schmidt's previous work using brief-computerized interventions. We will also consult with Drs. Rapee, Comer, and Chronis-Tuscano, who all have expertise in the design of parenting interventions. Additionally, as stated above, we will provide parents in the active condition with weekly reminders and additional online materials. We have created a preliminary version of this computerized intervention for our pilot sample. This preliminary intervention can be viewed at:

https://www.youtube.com/watch?v=3qN0Hco17VI.

For the control condition, we plan to utilize an active control previously used by Dr. Schmidt. This will be a computerized presentation, in the same format as the active intervention, but will focus on self-care topics – unrelated to error sensitivity. The computerized control presentation will be administered to both parents and children. Participants in the control condition will have access to online materials related to self-care between assessments. We view the current proposal as a first step in the development of a novel intervention targeting error sensitivity. If we are able to demonstrate initial target engagement (i.e., reduce the ERN), in future studies, we plan to examine the potential impact of dose and whether this intervention can provide incremental symptom reduction, in addition to existing treatment approaches for child anxiety.

6.0 Procedures Involved*

6.1 We plan to recruit 175 parent/child dyads, high in error sensitivity (measured with self-report), and randomize 150 to an intervention condition (50 to parent/child, 50 to parent only, 50 to child only) and 25 to an active control condition. We plan to utilize an unbalanced design (150 intervention versus 25 controls) due to the fact that longitudinal data in developmental samples suggests the ERN is typically stable or increases across development. Therefore, a decrease in the ERN is not expected to occur in the control group. We will measure the ERN in children pre and post intervention, as well as error sensitivity and anxiety symptoms. At a six-month follow-up, we will again assess children's ERN, as well as error sensitivity and anxiety symptoms. We chose a six-month follow-up assessment to allow for adequate time for the parenting intervention to impact children (1-month may be too brief to observe impact), as well as to allow for children and parents to access the additional online materials (24 modules will be offered). This time was also selected to minimize drop-out that might occur over longer follow-up periods.

Further, before and during all in-person lab visits, we plan to take protective measures in order to reduce any possible spread of COVID-19 and to prevent any individuals at higher risk from participating in our study. Provided IRB approval, we plan to resume lab visits on August 1 with these protective measures in place.

6.2 Year 1: intervention development, collect pilot data from 10 parent/child dyads.

Year 2 – 4: recruit and collect data from 6 parent/child dyads per month, total N = 175 parent/child dyads. We will also collect 6-month follow-up data in the lab for each parent/child dyad.

Year 5: complete all follow-ups. Data processing, analysis, statistical procedures and manuscript preparation.

Risks are fairly minimal. There is a chance that some parents or children may experience mild, transient distress during parts of the assessments. All questions (self-report) are the type typically asked during a routine psychological or medical evaluations. If necessary, the assessment can be interrupted or terminated. The family (parent and patient) will be clearly informed that they are free to terminate participation at any point in the protocol.

Upon scheduling their visit, subjects will be asked a series of questions to determine if they or anyone in their immediate family is at higher risk to being exposed to Coronavirus. Individuals who meets these criteria will be excluded from participation in the study. These questions will include:

1. "Are you or anyone in your immediate 65 years of age or older?"
2. "Do you, or anyone in your immediate family, have a serious medical condition such as diabetes, heart, lung, kidney, or liver disease, or severe obesity?"

3. "Do you or anyone in your immediate family have poor immunity due to cancer treatment or other conditions involving weakened immune systems?"

Prior to their in-lab visit, subjects will receive a phone call from research personnel updating them on the steps being taken to reduce the risk of Coronavirus transmission. On the day of each in-person lab visit, subjects will be called and asked an additional series of screening questions in order to see who may have been exposed to Coronavirus. Individuals who meets these criteria will be excluded from participation in the study. The screening questions and script to be used are as follows:

"In the past 14 days, has your family:

1. Traveled outside of the Tallahassee area?

2. Had flu-like symptoms such as cough, low-grade fever or high temperature (100.4°F), shortness of breath, and/or difficulty breathing?

3. Been in contact with a person who has flu-like symptoms or a person with suspect, probable or confirmed coronavirus (COVID-19)?

4. Been to a nursing home or state hospital?"

The EEG and startle recording is completely non-invasive. The EEG will be recorded with an ActiveTwo EEG recording system, which does not require abrading the skin. There is the possibility that some participants will experience mild, temporary itching or tingling sensation in response to the electrode cap or electrode gel.

Informed consent and assent will be obtained prior to participation, and risks will be explained carefully to the participants' parent. All information with identifying information collected during the project will be kept in a locked storage cabinet to which only Dr. Meyer and the study coordinator will have access. All data will be stored separately from identifying information and will be password protected. No names will be maintained in data records; rather, information will be coded by ID numbers only. Each individual will receive a unique I.D. number thereby allowing handling of data on all subjects without using individual names. PI Meyer will be responsible for monitoring the maintenance of confidentiality. In the event of a breach of confidentiality, he will inform the subject and his/her parents that the breach occurred; any breaches of confidentiality will be reported to the Institutional Review Board. Codifying participants by unique identifiers is an extensive practice that is highly efficient at protecting anonymous participation. No individual child or family will be identified in any publications or presentations of the research findings.

Upcoming procedures are repeatedly explained to the children and their parent, giving them a sense of control over what is happening in their environment. Rather than closed yes/no questions, open-ended questions with regard to comfort and well-being will be used throughout the procedures to give subjects the

opportunity to voice any concerns or discomfort. Subjects will also be given the opportunity to ask questions regarding the research procedures at any time during the protocol.

Although we don't expect it frequently, some subjects may endorse suicidality or increased risk for suicidality; in this event, safety assessments will be conducted and, when necessary, appropriate consultation with Dr. Meyer will be held to determine disposition. Dr. Meyer is a clinical psychologist, with an office on the same floor where the research will take place. In the event that a participant is in imminent danger to themselves, their parents will be informed. The participant and Dr. Meyer will meet with the subject and their parent to establish a safety plan – which may include transporting the child to the emergency room for further psychological evaluation or a referral for follow-up evaluation with an outside provider. Referrals will be on hand and can be provided. We will use validated procedures for suicide assessment, specifically the structured interview recommended by Joiner et al. (1999) & Chu et al. (2015), and use the following method to designate risk severity (refer to ABHC Suicide Risk Assessment form for detailed information on the assessment):

1. An individual's risk for suicide is designated nonexistent if he or she has no current suicidal symptoms, no history of suicide, and no or few other risk factors.

2. Risk for suicide is considered mild if the individual is a multiple attempter with no other risk factors or is a non-multiple attempter experiencing suicidal ideation of limited intensity and duration, no or mild resolved plans and preparation, and no or few other risk factors.

3. An individual is designated at moderate risk if he or she is a multiple attempter with any other significant risk factor. A non-multiple attempter with moderate to severe resolved plans and preparations or moderate to severe suicidal desire and ideation accompanied by at least two other risk factors is also considered to be at moderate risk for suicide.

4. A multiple attempter with two or more risk factors or a non-multiple attempter with moderate to severe symptoms of resolved plans and preparations accompanied by one other risk factor is designated at severe risk for suicide.

5. An individual is at extreme risk for suicide if he or she is a multiple attempter with severe resolved plans and preparation or is a non-multiple attempter with resolved plans and preparations and two or more other risk factors.

Once an individual has been assessed for suicide risk, we will take the following actions, as suggested by Joiner et al. (1999) and Chu et al. (2015):

In addition, if children and/or their parents endorse experiencing significant psychological distress (e.g., significant anxiety or depression) during any portion of the study, the participants will be offered referral information for psychotherapy and/or pharmacologic treatment at Florida State University and the surrounding community. Participants who are initially enrolled in the study

will not be excluded from completing study procedures if they begin receiving treatment during the study. Because information relating to child abuse may be assessed, the staff will follow federal and state child abuse reporting requirements. Participants will be informed of the need to report child abuse prior to eliciting this information. In case of any reported abuse by the child or parent, the parents will be informed about the federal mandated reporting laws, verbally and in writing. In cases where it is necessary to make a child abuse report, the family will always be informed prior to contacting any state agency, and given the option of making a self-referral to protective services.

6.3 EEG, self-report, observational video data, and clinical interviews will be collected.

Self-report. The current proposal will utilize dimensional measures of anxiety symptoms measured by the Screen for Child Anxiety Related Emotional Disorders (SCARED) questionnaire. Both the parent and child will complete the SCARED regarding anxiety symptoms experienced by the child before and after the treatment at the baseline assessment, and at the follow-up assessment.

To capture a broad spectrum of symptoms, we will also administers the Child Behavior Checklist (CBCL) at the baseline and follow-up assessment. The CBCL is a 113-tiem parent-report checklist that assesses emotional and behavioral problems (internalizing and externalizing) over the past 6 months. We will utilize the depression scale from this measure, as well as the obsessive compulsive scale.

Additionally, to assess error sensitivity in children, we will use our previously validated measure (i.e., the Child Error Sensitivity Index), before and after the intervention, and at follow-up. This measure includes 9 items indexing error sensitivity, for example: “I feel upset when other people don’t like something I have done”, “If I make a mistake, I always want to fix it”, and “When I make a mistake, I feel anxious”, and has good psychometric properties.

We will also assess parent’s sensitivity to their child’s errors before and after the intervention, and at follow-up. Our measure of Parent Sensitivity to Children’s Errors includes 20 items, such as the following: “When I notice a mistake my child made, I feel upset”, “If my child makes a mistake, I have a strong urge to fix it immediately”, “When my child makes a mistake, I feel anxious”, “I like to watch my child do things to make sure she/he doesn’t make mistakes.”

Additional self-report measures include the following (all will be uploaded under documents section):

Child:

Child and Adolescent Perfectionism Scale
CRPBI
CASI
Child report: parent sensitivity to my errors
Acceptability Measure

Parent:

IDAS
Parent ASI to child
Parent ASI
FASA
Parent report on child's error sensitivity
Parent sensitivity to child's errors
Parent error sensitivity
Avoidance questionnaire
CBQ
PSDQ
CRPBI
Acceptability Measure
Child Anxiety Life Interference Scale – Preschool Version (CALIS-PV)
Coping with Children's Negative Emotions Scale (CCNES)
Spence Preschool Anxiety Scale (Parent Report)

Observational behavioral task. We will also use a lab-based observational task to measure error sensitivity in children, as well as parent's sensitivity to their children's errors, before and after the intervention, and at the follow-up lab visit. These will be tasks that we have utilized in a previous study at FSU in this same age-range.

Episode 1: **Guessing Card Game (Headbands).**
"For this game, you will each wear one of these headbands. (demonstrate and then help participants get headbands on their head) You are each going to be given 10 cards. Please do not look at your cards. You will take turns guessing your own cards. When it is your turn, take the card from the top pile and put it in your headband, like this (demonstrate). You should NOT look at your card when you do this. You will ask questions to your partner to guess what your card is. Your questions can be things like: Am I an animal? Do I have feathers? Am I a thing? Am I a food? You cannot ask: What is my card?, but you can ask pretty much anything else. When you correctly guess your card, then you put the card face up in a pile and switch turns. Your goal is to correctly guess as many cards as possible before your time is up. Do you have any questions?"
Make sure parent and child have headbands on and have a pile of 10 cards each. Then tell the participants they can start and make sure to start the 3 minute timer and record the episode .
When timer goes off, enter the room and tell the family that they did a great job and that now it is time to start a new activity.
Episode 2: **Drawing while taking turns.**
"For this activity, we want you to draw these pictures yourselves. We want you to try to be as accurate as possible. You will take turns drawing. Each of you will only draw one line and then pass the drawing to your partner so that they can draw the next line. You

will go back and forth. Try to get as many completed as you can, while being accurate, within 3 minutes."
Give parent/child the pictures and blank paper and pens (not pencils). Tell the participants that they can start and set the 3 minute timer and record the episode .
When timer goes off, enter the room and tell the family that they did a great job and that now it is time to start a new activity.

Episode 3: **Picasso Tiles.**

"For this activity, _____(child's name) will build with the Picasso Tiles, while _____ (parent's name) will give directions. We would like you to use the Picasso Tiles to build, as accurately as possible, the design on this picture (point to image). If you finish this, you can move to the next one. We want _____ (parent's name) to be looking at the image and giving directions to _____ so that he/she can build the design. Please do not let _____ (child's name) look at the picture. We would like you to work together. Do you have any questions?"
Give child the Picasso Tiles and give the parent the images. Tell the participants they can start and set the 3 minute timer and record the episode .
When timer goes off, enter the room and tell the family that they did a great job and that now it is time to start a new activity.

Episode 4: Negative Discussion.

"For this activity, we want you to talk together about a time this week when _____ (child's name) did something wrong. If you can't think of something from this week, you can talk about the most recent situation that you can remember. You will have 3 minutes to have this discussion. Do you have any questions?"
Tell the participants that they can start and set the 3 minute timer and record the episode .
When timer goes off, enter the room and tell the family that they did a great job and that now it is time to start a new activity.

Episode 5: Positive Discussion.

"For this activity, we want you to talk together about a time this week when _____ (child's name) did something right. If you can't think of something from this week, you can talk about the most recent situation that you can remember. You will have 3 minutes to have this discussion. Do you have any questions?"
Tell the participants that they can start and set the 3 minute timer and record the episode .
When timer goes off, enter the room and tell the family that they did a great job and that now it is time to start a new activity.

The parent and child will be given directions for each task (which will last approximately 2 - 3 minutes) while being video-taped. The videos will be coded for sensitivity to mistakes (modified from Dr. Luby's coding schemes). For example, negative or positive statements regarding errors or imperfections will be coded (e.g., I hate making mistakes, I'm bad, I'll never do this right, etc.). After meeting with Dr. Luby at her lab for training on this approach, I will train a team of coders (undergraduate assistants) to code these observations reliably and use Mangold coding software to track codes second by second and to do reliability analyses.

EEG task. Children will complete a developmentally appropriate go-no/go task wherein they are instructed to "shoot" aliens when they see them on the screen (by clicking a mouse button) and "save" astronauts by not clicking when they are on the screen. After completing 5 practice trials, children complete 200 trials. Children will complete the go-no/go task before and after the intervention at the first lab assessment, and once at the follow-up lab assessment. We have used this task in children in this same age-range at Florida State University, with no adverse events.

The EEG assesses brain electrical activity through surface recording disks (electrodes) which are placed near the participant's head. The electrodes transmit the signals, which are then amplified and stored on a computer. The procedure is entirely non-invasive.
A custom designed 32-electrode Lycra cap will be placed on the participant's head. In order to record the brain's activity, these disks need to be filled will a gel which allows the electrodes to better record brain activity at the scalp. Therefore, the participants in this study will need to clean their hair after participation. The gel is completely water soluble, and the procedure is painless. Dr. Meyer's laboratory has sinks and towels, and the investigators will help to make sure the participant has thoroughly rinsed all the gel from their hair. After an accurate signal is assured, the signal derived from the electrode cap is then amplified, transmitted to a computer, and stored for later analysis.
In addition to the EEG recording, muscle activity from around the eyes may be recorded from the subjects. Muscle activity from around the eyes is recorded by small sensors that will be placed above and below the participant's left eye, as well as on the outer canthi (just below the eyebrow) of each eye. These procedures are completely non-invasive and painless.

EEG data processing and analyses. While participants complete the Go/No-Go task, EEG will be recorded from 32 scalp locations. The response-locked ERPs will be averaged separately for each trial type (e.g., correct and incorrect responses), and baseline correction will be performed using the interval from -500 to -300 ms before response commission. Average activity at three electrode sites (FCz, Cz, and Fz) between 0 and 100 ms after the response will be exported for each subject – we have previously shown that this is where the ERN is maximal and most reliable in children 82. In order to obtain a measure of differentiation between errors and correct responses, the average activity on correct trials will be subtracted from the average activity on error trials (i.e., the ERN).
Procedure. Research assistants will explain the study to parents and children and obtain consent for participation. Families will be randomized to a group (parent only, child only, parent/child, or control). Parents and children will participate in a brief observational task and complete questionnaires. Children will then complete the go-no/go task. After this, a trained research assistant will guide the child through the computer intervention or control. After the intervention, children will complete the go-no/go task again, and complete the observational task and questions. Simultaneously, parents will be completing questionnaires and will be administered the intervention or control. The first lab assessment will take approximately 2 – 3 hours.

The second lab assessment will take place approximately 6 months later. At this lab visit, both parents and children will complete follow-up questionnaires and behavioral observation. Additionally, children will complete the go-no/go task.

Clinical Interviews. We plan to conduct two clinical interviews with the parent, at each lab visit. Both interviews are assessments we routinely utilize in our research studies at FSU and will be conducted by a research assistant or graduate student who is trained in the administration of these interviews and has demonstrated reliability. We plan to complete the Schedule for Affective Disorders and Schizophrenia for School-Age Children: Present and Lifetime Version (K-SADS-PL: Kaufman, Birmaher et al., 1997) with the parent regarding the child's symptoms. Additionally, we plan to complete the Mini-International Neuropsychiatric Interview (MINI SCID) with the parent regarding their own symptoms. We anticipate that these interviews (together) will take approximately 30 – 40 minutes to complete. As in previous studies, the interviews will be audio recorded for the purposes of coding reliability. Participants will be asked if it is ok to record the interview before each interview begins.

6.4 There is no plan for follow-up after the second lab assessment.

7.0 Data and Specimen Banking*

7.1 All information with identifying information collected during the project will be kept in a locked storage cabinet to which only Dr. Meyer and the study coordinator will have access. All data will be stored separately from identifying information and will be password protected. No names will be maintained in data records; rather, information will be coded by ID numbers only. Each individual will receive a unique I.D. number thereby allowing handling of data on all subjects without using individual names. PI Meyer will be responsible for monitoring the maintenance of confidentiality. In the event of a breach of confidentiality, he will inform the subject and his/her parents that the breach occurred; any breaches of confidentiality will be reported to the Institutional Review Board. Codifying participants by unique identifiers is an extensive practice that is highly efficient at protecting anonymous participation. No individual child or family will be identified in any publications or presentations of the research findings.

7.2 EEG data, self-report data, observation video data will be stored for each participant.

7.3 If a participant requests their data (EEG, self-report, or observational video data), we will provide a summary of relevant data, along with a brief description of the measure. Data will not be released to anyone other than a participant.

8.0 Sharing of Results with Subjects*

8.1 We do not plan to share results with participants (unless they request us to do so).

9.0 Study Timelines*

9.1 Describe:

- Each subject will participate in the study for 6 months.
  - Year 1: intervention development, collect pilot data from 10 parent/child dyads.
  - Year 2 – 4: recruit and collect data from 6 parent/child dyads per month, total N = 175 parent/child dyads. We will also collect 6-month follow-up data in the lab for each parent/child dyad.
  - Year 5: complete all follow-ups. Data processing, analysis, statistical procedures and manuscript preparation.

10.0 Subject Population*

10.1 Participants in the study will be 175 parent and child dyads recruited using the Family Registry at Florida State University (FSU). I plan to recruit families with children between the ages of 5 and 7 years of age.

10.2 We plan to recruit parent/child dyads who are high in error sensitivity (as measured by the Child Error Sensitivity Index, self-report). Because our intervention will be designed to target error sensitivity, we will recruit families who score at least .5 standard deviations above the mean on the Child Error Sensitivity Index or the Parent Sensitivity to Children's Errors Index. We will derive means and standard deviations from our previous study, which was conducted in this same age-range and community. Additionally, we will request that the primary caregiver accompany the child to the lab visit (i.e, spends at least 50% or more of total parenting time with the child). Prior to the in-lab visit, participants will complete an additional phone screen to determine whether they meet any Coronavirus-specific exclusion criteria. This phone screen will assess whether participants may have contacted Coronavirus and whether they are at higher risk for severe illness. Any participants who do not pass this screening will not be permitted to take part in the study.

10.3 This study will not include: adults unable to consent, pregnant women, prisoners. The study will include: children.

11.0 Vulnerable Populations*

11.1 This research study involves children between the ages of 5 – 7 years old. We will collect parental consent for all study procedures, as well as child assent. Additionally, children will be reminded throughout the lab visit that they can take a break or stop the study at any time.

12.0 Local Number of Subjects

12.1 175 parent/child dyads.

13.0 Recruitment Methods

13.1 Participants in the study will be 175 parent and child dyads recruited using the Family Registry at Florida State University (FSU) or a targeted mailing list. The FSU Center for Developmental Science implements on-going recruitment throughout the Tallahassee community, focusing on children and families. They maintain a database, which includes the names, ages, and contact information of children and families interested in participating in research studies. The Family Registry is comprised of over 1,500 families to date, and continues to grow each week due to regular recruitment events in the community. I plan to recruit families with children between the ages of 5 and 7 years of age. In addition to utilizing the Registry at FSU, I plan to post fliers in the community and recruit families at additional community events.

13.2 Source of recruitment: FSU Center for Developmental Science Family Registry and fliers that will be posted through-out the community. We also plan to utilize a targeted mailing list for children and families in the Tallahassee community.

13.3 We plan to recruit parent/child dyads who are high in error sensitivity (as measured by the Child Error Sensitivity Index, self-report). Because our intervention will be designed to target error sensitivity, we will recruit families who score at least .5 standard deviations above the mean on the Child Error Sensitivity Index or the Parent Sensitivity to Children's Errors Index. We will derive means and standard deviations from our previous study, which was conducted in this same age-range and community. Additionally, we will request that the primary caregiver accompany the child to the lab visit (i.e, spends at least 50% or more of total parenting time with the child). If interested in participating, caregivers will complete an additional phone screen to determine whether they meet any Coronavirus-specific exclusion criteria. This phone screen will assess whether participants may have contacted Coronavirus and whether they are at higher risk for severe illness. Any participants who do not pass this screening will not be permitted to take part in the study.

13.4 The flier that we plan to use for recruitment will be attached to this submission. It includes a picture of a minions stuffed animal with an EEG

cap on. We state that families with children between the ages of 5 and 7 are eligible to participate in our study and provide our lab contact information. Additionally, we plan to send letters to families in the Tallahassee area who have children between the ages of 5 – 7 years old. This mailing list will be purchased from Direct Mail. The letter that we plan to send to potential participants will be attached to this submission.

13.5 The families will also receive a significant honorarium, $60.00 for the baseline visit and $60.00 for the follow-up assessment, and each visit should last no more than 3 hours. Providing the honorarium to the family, rather than the child, reduces the possibility that payment could be coercive—we leave it up to the parent to decide how to allocate the honorarium. If participants live more than 30 miles away, we will offer travel reimbursement of up to $40. Additionally, families will be offered a t-shirt for parents and children for completion of the between assessment online modules.

14.0 Withdrawal of Subjects*

14.1 We do not anticipate subjects being withdrawn from the study without their consent.

14.2 n/a

15.0 Risks to Subjects*

15.1 Risks:

Risks are fairly minimal. There is a chance that some parents or children may experience mild, transient distress during parts of the assessments. All questions (self-report) are the type typically asked during a routine psychological or medical evaluations. If necessary, the assessment can be interrupted or terminated. The family (parent and patient) will be clearly informed that they are free to terminate participation at any point in the protocol.
The EEG and startle recording is completely non-invasive. The EEG will be recorded with an ActiveTwo EEG recording system, which does not require abrading the skin. There is the possibility that some participants will experience mild, temporary itching or tingling sensation in response to the electrode cap or electrode gel.
Informed consent and assent will be obtained prior to participation, and risks will be explained carefully to the participants' parent. An additional "Coronavirus Information Sheet" will be provided to participants in order to address any concerns about the steps being taken by research staff.

All information with identifying information collected during the project will be kept in a locked storage cabinet to which only Dr. Meyer and the study coordinator will have access. All data will be stored separately from identifying information and will be password protected. No names will be maintained in data

records; rather, information will be coded by ID numbers only. Each individual will receive a unique I.D. number thereby allowing handling of data on all subjects without using individual names. PI Meyer will be responsible for monitoring the maintenance of confidentiality. In the event of a breach of confidentiality, he will inform the subject and his/her parents that the breach occurred; any breaches of confidentiality will be reported to the Institutional Review Board. Codifying participants by unique identifiers is an extensive practice that is highly efficient at protecting anonymous participation. No individual child or family will be identified in any publications or presentations of the research findings.

Upcoming procedures are repeatedly explained to the children and their parent, giving them a sense of control over what is happening in their environment. Rather than closed yes/no questions, open-ended questions with regard to comfort and well-being will be used throughout the procedures to give subjects the opportunity to voice any concerns or discomfort. Subjects will also be given the opportunity to ask questions regarding the research procedures at any time during the protocol.

Although we don't expect it frequently, some subjects may endorse suicidality or increased risk for suicidality; in this event, safety assessments will be conducted and, when necessary, appropriate consultation with Dr. Meyer will be held to determine disposition. Dr. Meyer is a clinical psychologist, with an office on the same floor where the research will take place. In the event that a participant is in imminent danger to themselves, their parents will be informed. The participant and Dr. Meyer will meet with the subject and their parent to establish a safety plan – which may include transporting the child to the emergency room for further psychological evaluation or a referral for follow-up evaluation with an outside provider. Referrals will be on hand and can be provided. We will use validated procedures for suicide assessment, specifically the structured interview recommended by Joiner et al. (1999) & Chu et al. (2015), and use the following method to designate risk severity (refer to ABHC Suicide Risk Assessment form for detailed information on the assessment):

1. An individual's risk for suicide is designated nonexistent if he or she has no current suicidal symptoms, no history of suicide, and no or few other risk factors.
2. Risk for suicide is considered mild if the individual is a multiple attempter with no other risk factors or is a non-multiple attempter experiencing suicidal ideation of limited intensity and duration, no or mild resolved plans and preparation, and no or few other risk factors.
3. An individual is designated at moderate risk if he or she is a multiple attempter with any other significant risk factor. A non-multiple attempter with moderate to severe resolved plans and preparations or moderate to severe suicidal desire and ideation accompanied by at least two other risk factors is also considered to be at moderate risk for suicide.
4. A multiple attempter with two or more risk factors or a non-multiple attempter with moderate to severe symptoms of resolved plans and preparations

accompanied by one other risk factor is designated at severe risk for suicide.
5. An individual is at extreme risk for suicide if he or she is a multiple attempter with severe resolved plans and preparation or is a non-multiple attempter with resolved plans and preparations and two or more other risk factors.
Once an individual has been assessed for suicide risk, we will take the following actions, as suggested by Joiner et al. (1999) and Chu et al. (2015):
In addition, if children and/or their parents endorse experiencing significant psychological distress (e.g., significant anxiety or depression) during any portion of the study, the participants will be offered referral information for psychotherapy and/or pharmacologic treatment at Florida State University and the surrounding community. Participants who are initially enrolled in the study will not be excluded from completing study procedures if they begin receiving treatment during the study. Because information relating to child abuse may be assessed, the staff will follow federal and state child abuse reporting requirements. Participants will be informed of the need to report child abuse prior to eliciting this information. In case of any reported abuse by the child or parent, the parents will be informed about the federal mandated reporting laws, verbally and in writing. In cases where it is necessary to make a child abuse report, the family will always be informed prior to contacting any state agency, and given the option of making a self-referral to protective services.

In addition to other possible harms or discomforts related to this research, there may be risks by having participants take part in face-to-face study activities during this time of the Coronavirus emergency. Face-to-face activities and contact with other persons may increase the risk of getting Coronavirus. No one is yet quite sure how easily Coronavirus passes from person to person, how to know for certain when someone has or does not have Coronavirus, or what works best at preventing Coronavirus from spreading.

Getting Coronavirus may result in a person being isolated or quarantined at home and away from work, family and other activities. Coronavirus is a serious illness that may require medical care including hospital care, long-term disability, and even death.

Certain persons are at higher risk for severe illness from Coronavirus, and these persons are not permitted to take part in our study. Persons thought to be at higher risk include:

- Being 65 years of age or older
- Prior or current exposure to persons that have Coronavirus whether or not they know it
- Persons of any age with serious medical conditions such as diabetes, and heart, lung, kidney or liver disease, or persons who are severely obese
- Persons who have poor immunity, such as persons under cancer treatment or who have other conditions with weakened immune systems

- People who reside in or have visited nursing homes or other long-term care facilities in the 14 days prior to the lab visit.
- People who have been experiencing or have been in contact with someone experiencing flu-like symptoms such as cough, low-grade fever or high temperature (100.4°F), shortness of breath, and/or difficulty breathing in the 14 days prior to the lab visit.
- Traveled outside of the Tallahassee area in the 14 days prior to the lab visit.

All participants and study personnel will therefore be asked some questions to see who may be at risk of severe illness, or who have been exposed to Coronavirus. Even after questions are asked, participants are strongly encouraged to inform research personnel if they think that at any time before or during the study they may been exposed to Coronavirus or are at risk of severe illness. Such participants will not be permitted to participate in this study. While the study staff will take steps to protect themselves and participants from exposure to Coronavirus when they take part in face-to-face activities, there is always the chance that an individual may still be exposed.

In order to reduce exposure to Coronavirus, upon arrival in the lab we will take the temperature of all participants. If a participant has a high temperature (≥100.4°F), we will wait 10 to 15 minutes take temperature a second time, to ensure accuracy. During each visit, study staff will stay at least six feet away from anyone else during research activities, excluding times when closer contact is necessary, such as when EEG is being set up, taken down, and when some computer tasks are being initiated. Study staff will conduct a maximum of one lab visit per day to reduce the chance of overlap or contamination between participants. We will also limit each lab visit to the minimum amount time and staff required to complete the study protocol. All materials will be sanitized after being utilized by participants and study staff. All disposable used items will be thrown away immediately following the lab visit. Any items that are punctured, torn, or contaminated during the visit will be rotated immediately. Study staff and participants will also be required to wear a face mask to cover their mouth and nose, wear gloves to cover their hands, wash and sanitize their hands at regular intervals; and not touch their face or anything else during study activities. If participants need protective gear such a face mask and/or gloves, study staff will provide these materials.

In addition to the risks of these Coronavirus-related harms or discomforts, this research may have risks of other Coronavirus-related harms or discomforts that are unknown at this time. Participants will be informed if any such risks are determined in the future. All participants will be reminded that if at any point they do not feel safe with the protective measures that are being taken, they can let us know and we will stop the study immediately.

15.2 *n/a*

15.3 *n/a.*

16.0 Potential Benefits to Subjects*

16.1 We have conducted the original study that utilized many of the same measures used in the current proposal, and most children enjoy participating in the assessments, which are presented as games, and all children will win prizes and receive small gifts during the course of the tasks. The families will also receive a significant honorarium, $60.00 for the baseline visit and $60.00 for the follow-up assessment, and each visit should last no more than 3 hours. Providing the honorarium to the family, rather than the child, reduces the possibility that payment could be coercive—we leave it up to the parent to decide how to allocate the honorarium. If participants live more than 30 miles away, we will offer travel reimbursement of up to $40. Periodic updates about selected research findings for the sample as a whole will be provided to subjects and their parents. Many participants derive satisfaction from knowing that they are contributing to knowledge about children's development. Although this is not a clinical sample, parents who have concerns about their child's adjustment or functioning will have the opportunity to meet with Dr. Meyer (who is a clinical psychologist), and referrals will be provided if appropriate.

16.2 n/a

17.0 Data Management* and Confidentiality

17.1 Data analysis plan: AIM 1: Assess initial target engagement by examining whether a neural marker of risk for anxiety (i.e., the ERN) in children is decreased during a single lab visit, via a brief, computerized intervention designed to target error sensitivity. We hypothesize that children who receive the intervention will display a decrease in the ERN at the first assessment, compared to children in the control condition. 1a. Assess alternate measures of target engagement. Self-report and observational measures of error sensitivity will also be decreased for parents and children who receive parent and child active interventions, respectively. AIM 2: Examine whether children in the intervention conditions display a reduction in the ERN from the initial lab assessment to the six-month follow-up assessment. We expect that children in all treatment conditions (parent/child, parent only, child only) will display a reduced ERN compared to the control group. 2a. Dissociate the impact of parent/child, parent only, versus child only treatment conditions. We hypothesize that children in the combined treatment group (parent/child) will have the greatest reduction in the ERN. 2b. Examine the impact of

utilization. We expect that parents and children who utilize the treatment materials more frequently will experience the greatest reduction in the ERN. 2c. Assess alternate measures of target engagement. We will also examine all hypotheses in relation to self-report and observed measures of parent and child error sensitivity. AIM 3: Examine whether parent/child dyads in the intervention conditions experience changes in anxiety symptoms at the six-month follow-up. We hypothesize that the dyads in the intervention conditions will experience greater changes in anxiety symptoms compared to the control group. We will also compare conditions, as well as examine the impact of utilization. In exploratory analyses, we will examine to what extent changes in the ERN and error-sensitivity relate to changes in anxiety symptoms in children.

17.2 Informed consent and assent will be obtained prior to participation, and risks will be explained carefully to the participants' parent. All information with identifying information collected during the project will be kept in a locked storage cabinet to which only Dr. Meyer and the study coordinator will have access. All data will be stored separately from identifying information and will be password protected. No names will be maintained in data records; rather, information will be coded by ID numbers only. Each individual will receive a unique I.D. number thereby allowing handling of data on all subjects without using individual names. PI Meyer will be responsible for monitoring the maintenance of confidentiality. In the event of a breach of confidentiality, he will inform the subject and his/her parents that the breach occurred; any breaches of confidentiality will be reported to the Institutional Review Board. Codifying participants by unique identifiers is an extensive practice that is highly efficient at protecting anonymous participation. No individual child or family will be identified in any publications or presentations of the research findings.

Upcoming procedures are repeatedly explained to the children and their parent, giving them a sense of control over what is happening in their environment. Rather than closed yes/no questions, open-ended questions with regard to comfort and well-being will be used throughout the procedures to give subjects the opportunity to voice any concerns or discomfort. Subjects will also be given the opportunity to ask questions regarding the research procedures at any time during the protocol.

17.3 n/a.

17.4 n/a

18.0 Provisions to Monitor the Data to Ensure the Safety of Subjects*

This section is required when research involves more than Minimal Risk to subjects.

18.1 n/a

19.0 Provisions to Protect the Privacy Interests of Subjects

19.1 All information with identifying information collected during the project will be kept in a locked storage cabinet to which only Dr. Meyer and the study coordinator will have access. All data will be stored separately from identifying information and will be password protected. No names will be maintained in data records; rather, information will be coded by ID numbers only. Each individual will receive a unique I.D. number thereby allowing handling of data on all subjects without using individual names. PI Meyer will be responsible for monitoring the maintenance of confidentiality.

19.2 Upcoming procedures are repeatedly explained to the children and their parent, giving them a sense of control over what is happening in their environment. Rather than closed yes/no questions, open-ended questions with regard to comfort and well-being will be used throughout the procedures to give subjects the opportunity to voice any concerns or discomfort. Subjects will also be given the opportunity to ask questions regarding the research procedures at any time during the protocol.

19.3 All data will be stored separately from identifying information and will be password protected.

20.0 Compensation for Research-Related Injury

20.1 n/a

20.2 n/a

21.0 Economic Burden to Subjects

21.1 n/a

22.0 Consent Process

22.1 The consent and assent process will take place at the beginning of the lab visit in a room in the lab. Additionally, throughout the lab visit, upcoming procedures are repeatedly explained to the children and their parent, giving them a sense of control over what is happening in their environment. Rather than closed yes/no questions, open-ended questions with regard to comfort and well-being will be used throughout the procedures to give subjects the opportunity to voice any concerns or discomfort. Subjects will also be given the opportunity to ask questions regarding the research procedures at any time during the protocol.

Subjects who are not yet adults (infants, children, teenagers)

- Participants in the study will be between the ages of 5 – 7 years old, so they will be individuals under the age of 18 years and therefore not yet adults.
- Parental permission will be obtained from one parent (the parent who accompanies the child to the lab visits).
- Assent will be obtained from the child participant. This will be documented with the child assent form (attached to this submission).

23.0 Process to Document Consent in Writing

23.1 To obtain consent, we will be following "SOP: Written Documentation of Consent (HRP-091)."

23.2 n/a

23.3 A consent and assent form will be submitted with this application.

24.0 Setting

24.1 The research team will identify and recruit potential subjects from the FSU Family Registry and from fliers that will be distributed through-out the community. Research procedures will be performed in the lab space in the Psychology Building on the FSU campus.

25.0 Resources Available

25.1 We have recently completed a study at FSU where we recruited 100 children between the ages of 5 and 7 years old, and then conducted a 1-year follow-up assessment. We retained approximately 88% of the sample at the follow-up assessment. Therefore, we expect the attrition rate for the current proposal to be slightly lower than this (due to a shorter follow-up period of 6 months). We estimate that we will retain 90% of the sample (N = 155). Analyses will be conducted to ensure that families that are lost to follow-up do not differ significantly from the overall sample on any main study variables.

26.0 Multi-Site Research* (Delete this section if this is not a Multi-Site Research Study.)

n/a