CHILDREN'S NATIONAL HEALTH SYSTEM
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RESEARCH PROTOCOL

TITLE: Improving Asthma Outcomes through Stress Management

SHORT TITLE: Breathe With Ease: A Unique Approach to Managing Stress (BEAMS)

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A. SPECIFIC AIMS

Uncontrolled asthma in at-risk youth responds well to guideline-based therapy when patients remain adherent to their management plans.[1] Adherence to inhaled corticosteroids (ICS), when indicated for persistent or uncontrolled asthma, is a critical component of most asthma management plans,[2] and other self-management practices such as trigger avoidance are similarly related to improved asthma outcomes. Adherence to self-management practices is mediated by multiple factors, including psychosocial stress of parents[*] and their children.[3]

A targeted, culturally appropriate intervention to manage psychosocial stress among the parents of young, African American, and socioeconomically disadvantaged urban children with asthma who are receiving guideline-based care may improve asthma self-management, and therefore asthma outcomes.

Our overall aim is to implement and evaluate a highly collaborative, multi-dimensional, culturally appropriate and community-based asthma intervention to augment existing guideline-based best practice. The intervention will target the parents of at-risk, urban, African American youth, and will employ individualized psychosocial stress management and peer support.

We will conduct a single blind, prospective randomized controlled trial comparing the IMPACT DC Asthma Clinic's existing intervention of guideline-based clinical care, education, and short-term care coordination (usual care) to usual care plus parental stress management in a cohort of up to 250 parent-child dyads of AA youth aged 4-12 years.

Specific Aim 1. To measure the uptake of each intervention component by participants. This aim is not hypothesis driven, however it is an important aspect of our research question, as we have designed a multi-modal intervention based on input from a broad group of stakeholders, including parents,

[*] We recognize that the actual home caregivers of young patients with asthma may be biologic parents, adoptive parents, foster parents, and other relatives and legal guardians. For simplicity, we will use the term "parents" to refer to all potential home caregivers and to distinguish the group from clinicians and other school and community-based caregivers.

community-based clinicians and service providers, as well as national experts in asthma and stress management.

Specific Aim 2. To determine the effect that a stress management intervention has on the primary measured outcome: symptom free days. Other patient/family-centered outcomes will include parent stress, quality of life, asthma morbidity, healthcare utilization, and medication adherence.

> ***Hypothesis 1:*** The principal hypothesis is that the number of symptom-free days over a two week period (primary outcome) at 6 month follow-up will be significantly higher among parents in Arm 2 (usual care plus the intervention) than in Arm 1 (usual care alone).

Impact of Study on Health Decisions: The proposed study will provide novel insights into the contribution of parent stress to family difficulties in child asthma management and control. The primary goal of this project is to address the need for a multi-dimensional approach to a multi-faceted problem in asthma care and address disparities facing families, particularly in the area of stress management. This knowledge will inform the decisions of parents, in addition to health systems, clinicians, and community-based programs that seek to improve pediatric asthma outcomes and reduce disparities. Results of the study will be disseminated to a broad range of stakeholders, including parents of children with asthma, clinicians, and other service providers. The dissemination strategy will be developed in partnership with representatives of these key stakeholders.

B. BACKGROUND AND SIGNIFICANCE

Background: Burden of Pediatric Asthma on the Health of Children

Asthma is the most common chronic pediatric disease in the United States, affecting 7 million children <18 years in 2010.4 Despite effective NIH guidelines for care, overall morbidity among youth with asthma, whether measured by attack rates, emergency department (ED) visits, hospitalizations, or deaths, have not decreased.[4] Further, striking disparities persist among youth with asthma, as socio-economically disadvantaged, urban, and minority children throughout the United States incur a disproportionate burden of asthma-related morbidity.[5,6] The overall ED visit rate for asthma, for example, among non-Hispanic African Americans (AAs) aged 0-17 years is 4.1 times greater than that among non-Hispanic whites. Similarly, the asthma death rate among non-Hispanic AAs aged 0-17 years is 7.3 times greater than that among non-Hispanic whites, while the death rate among Hispanics in the same age group is 1.2 times greater than non-Hispanic whites.[7]

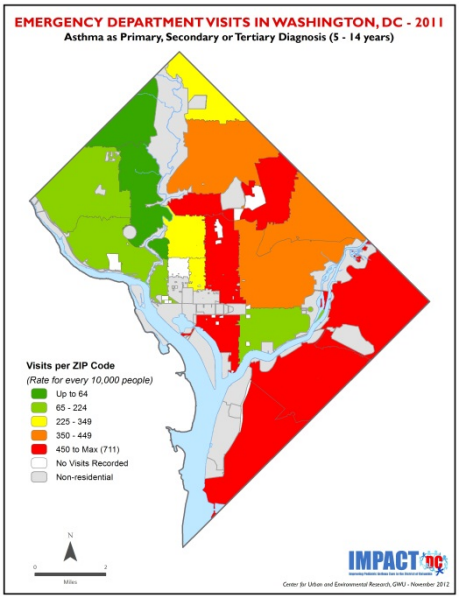

Figure 1: 2010 ED visit rates for asthma by DC zip code, ages 5-14y
www.impact-dc.org

Washington, DC provides a useful local case study of these disparities. Like highly urbanized areas elsewhere, the city has both high prevalence and high morbidity rates that disproportionately affect at-risk, minority youth. In 2008, the

current asthma prevalence was 3.0 times greater among non-Hispanic AA youth than among non-Hispanic whites.[8]

Disparities in morbidity due to pediatric asthma are even more dramatic (Figure 1). ED visits and hospitalizations are heavily concentrated among AA children residing in the socioeconomically disadvantaged northeast and southeast neighborhoods of the District, especially those lying east of the Anacostia River. In 2010, the ED visit rates for asthma among youth residing in the most disadvantaged zip codes of southeast DC were >10 times greater than the more advantaged zip codes of northwest DC.[9] While AAs and Hispanics make up only 60.0% of DC residents,[10] over 95% of all pediatric ED visits for asthma in DC are made by AA and/or Hispanic youth.[9]

Significance: The Knowledge Gap

Existing studies provide evidence of a link between psychosocial stress and asthma severity in both adults and children. This relationship is complex, and a model such as that of Lazarus and Folkman[11] provides a means to conceptualize stress as a multi-dimensional construct with at least three domains:

1. Stress-provoking factors (traumatic life events, domestic and/or neighborhood violence, substance abuse, financial strain, racial or ethnic discrimination)
2. Stress-mediating factors which may interact with or modify the effects of stress-provoking factors (self-coping mechanisms, peer, family, or professional social support)
3. Stress-resulting factors which reflect the possible psychological sequelae (depression, anxiety).

Together, these factors work through the parent-child dyad (Figure 2) to mediate a wide range of asthma outcomes, including physiologic parameters (immune response to allergens and infections, lung function), daily symptomatic impairment, exacerbations, responses to therapy, and choices/behaviors regarding adherence to medical care. Specifically, higher stress levels may directly increase airway inflammation and reactivity (through immunologic, autonomic, and neuro-endocrine effects) and/or decrease the effect of asthma controller and reliever medications. In addition, stress may alter a parent's perception and management of their child's asthma symptoms,[12] accentuating or down-playing them. It may also affect their perceptions, expectations, and interpretations of asthma health outcomes, affecting subjective outcome measures such as quality of life measures.[13,14] Finally, and crucially from the perspective of our proposed intervention, parental stress (and its psychological correlates such as depression[15] and anxiety) may worsen their child's adherence to asthma medications (including ICS) and other management strategies, resulting in more asthma symptoms and exacerbations. Bartlett et al,[16] for example, studied mothers of minority children with asthma in Baltimore and Washington, DC and found that maternal depressive symptoms were strongly associated with risk for non-adherence.

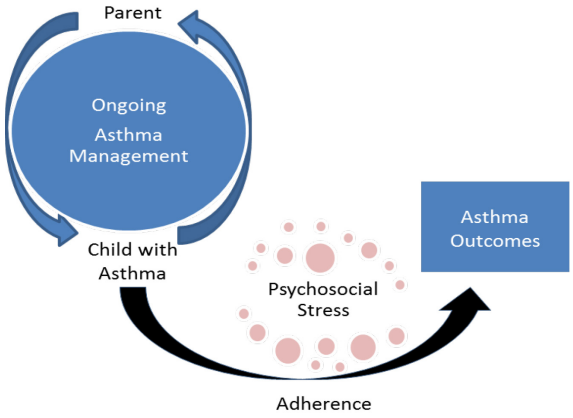

Figure 2

In spite of this emerging understanding of the multidimensional pathways linking high psychosocial stress and worsened airway obstruction in asthma, **few studies have directly studied the efficacy of interventions utilizing psychosocial stress management on patient-centered measures of asthma care and outcomes.**[17,18,19,20,21,22] Even *fewer* have focused on the parents of at-risk, urban, AA and/or Hispanic children.[23] In fact, a comprehensive search of *ClinicalTrials.gov* in mid-September

2013 revealed *no* ongoing registered trials of interventions targeting stress reduction in parents of children with asthma. A single ongoing trial (NCT1445015) targets inner-city adolescents themselves. **The role of increased psychosocial stress as a mediator of poor asthma outcomes *and* the paucity of studies of interventions employing stress management have been identified as concerns by federal agencies, national academic figures, clinicians, *and* parent/patient groups.** In its discussion of barriers to the implementation of guidelines-based asthma care, for example, the *2012 Coordinated Federal Action Plan to Reduce Racial and Ethnic Asthma Disparities*[24] highlighted the importance of psychosocial factors, specifically noting the following:

a. *Lack of family resources and community support for appropriate asthma self-management behaviors.*
b. *Higher levels of chronic stress and acute exposures to violence, which exacerbates asthma and impedes adherence to therapy.*
c. *Competing priorities, such as food/housing insecurity, that impact a family's ability to address asthma.*

In addition, the most recent *Guidelines for the Diagnosis and Management of Asthma from the NAEPP/NHLBI/NIH*[2] *(EPR-3)* make repeated note of the incompletely understood role of psychosocial stress in asthma morbidity and urge clinicians to assess levels of stress and, when appropriate, to make referrals to appropriate support services. Of note however, no specific references are provided in EPR-3 for the effectiveness of stress management in asthma management, and the Panel explicitly states that ***"Clinical trials are needed to evaluate the effect of stress and stress reduction on asthma control..."***

Independent expert reviews of the role of stress in chronic disease in general, and asthma in particular, have repeatedly called for more studies of interventions to mitigate stress and improve disease outcomes. In a recent comprehensive review of parenting stress among caregivers of children with chronic disease, Cousino and Hazen,[25] for example, explicitly concluded that *"Parenting stress is an important target for future intervention."* In a recent monograph published as part of the Asthma Outcomes Workshop convened by the leadership of multiple Institutes of the NIH, Rand and Wright et al[3] emphasized the importance of measuring *and* addressing stress as a mediator of asthma outcomes.

Through parental focus groups, parents of at-risk urban children with asthma both nationally and locally have cited psychosocial stress as a potent barrier to the management of their children's asthma.[26] In a 2005 review of patient-identified barriers to asthma treatment adherence, Bender and Bender found that low-income and minority patients repeatedly noted *"daily life hassles"* as an important barrier, suggesting that *"…information from patients' perspectives indicates the need to reappraise current strategies for the management of asthma…"*[27] **Results from our own pilot efforts in DC assessing barriers to care for inner-city families are illustrative as well.** Through a series of focus groups funded by the Kellogg Foundation and performed in conjunction with the Urban Institute, we repeatedly found social stress (manifest as coping with job loss, safety concerns, parental poor health, housing insecurity, and food insecurity) reported as a potent and consistent barrier to caring for their children.[28]

Finally, expert reviews of possible interventions to address asthma disparities have stressed the importance of multi-dimensional approaches to the multi-factorial problem. Canino et al[29] recently noted, for example, that, *"Given that the causes of asthma disparities are complex and multilevel, clinical strategies to address these disparities must therefore be comparably multilevel and target many aspects of asthma care."* **Through this framework, interventions may leverage**

innovations in mobile technology. In a recent review of the use of technology among young people with asthma, Nickels and Dimov[30] noted that *"The positive attitude toward use of social media or mobile technology opens the possibility for future studies to further explore the potential benefits of such interventions."* The penetration of electronic connectivity among disadvantaged inner-city families is remarkable. In a recent study of 509 largely minority and publicly insured families seen in an urban pediatric ED,[31] nearly 100% reported access to the Internet. However, our own focus groups have shown mixed receptivity to technological interventions in context of a stress management program.[32]

C. PRELIMINARY STUDIES

C.1. Validation of the IMPACT DC Intervention

The IMPACT DC Asthma Clinic is a unique program of asthma care, education and care coordination at Children's National Health System that targets children who are heavily dependent on emergency departments for episodic care, and is designed to transition patients to more effective longitudinal asthma care in their primary medical care homes.

In its pivotal randomized controlled trial, the IMPACT DC intervention improved outcomes in multiple domains (Figures 3a and 3b).[33] Of note, it increased adjusted adherence to ICS by greater than 100% at six month follow-up [adjRR 2.03, 95% confidence intervals (1.57, 2.63)] and reduced the rate of ED visits for asthma by over 40% [adjRR 0.54, 95% confidence intervals (0.40, 0.72)]. The intervention also improved multiple other proximal and distal measures of adherence and health outcomes, including asthma-related quality of life.

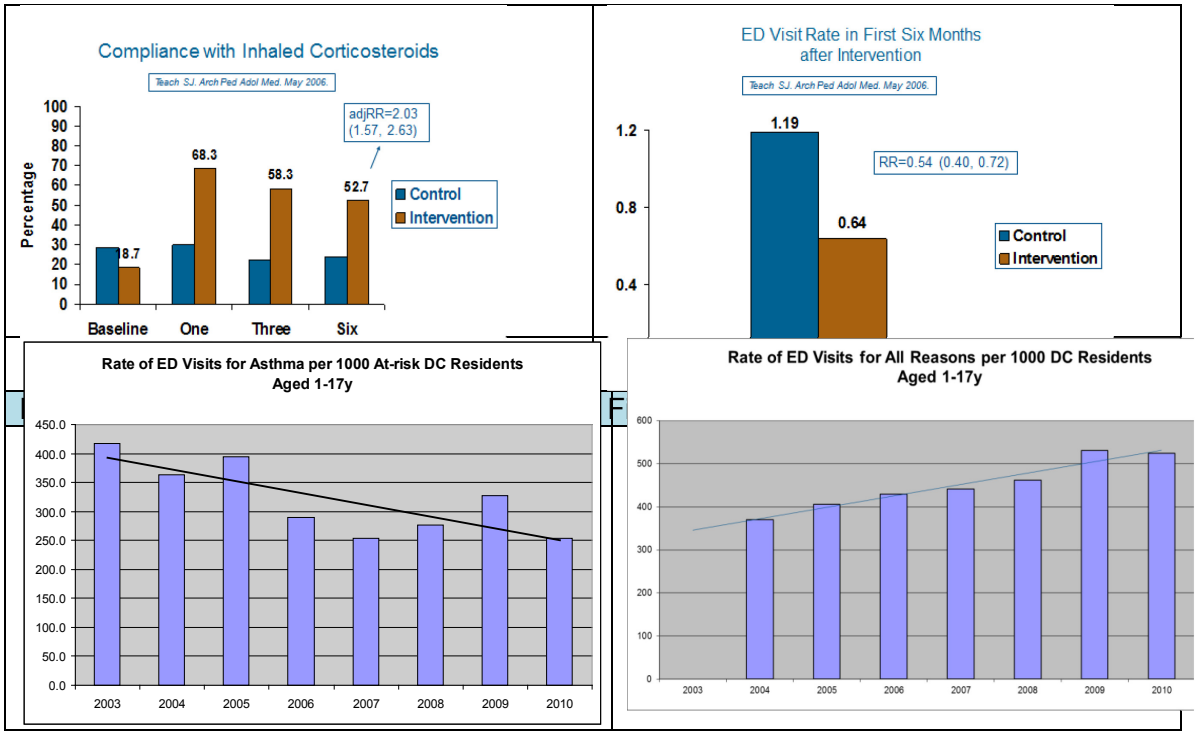

Figure 4a	Figure 4b

While demonstrating the efficacy of IMPACT DC's intervention within a clinical trial is impressive, IMPACT DC's existence has also been associated with a dramatic and sustained 40% drop in the rate of ED visits for asthma among all DC youth with asthma. This drop has occurred at a time when the overall rate of ED visits for all reasons by DC youth has been steadily rising (Figures 4a and 4b).

These improvements in care and outcomes among at-risk DC youth with asthma are impressive, but <u>significant</u> work remains. Even within the context of IMPACT DC's tightly scripted and guideline-based program of care, adjusted ICS adherence declined to nearly 50% within the intervention group by six months. Similarly, the rate of ED visits for asthma among DC youth in 2009 was still nearly three times the national rate.[4] ***The guideline-based IMPACT DC intervention, like validated interventions everywhere that target asthma disparities, needs to improve further.***

C.2. Stress Management

Existing psychosocial support interventions for parents of young children with T1D have demonstrated increased perceived support, decreased family burden, and improved coping.[34] **Dr. Streisand's recently completed NIH-funded RCT (NIH, DK080102) directly addressed stress management among parents by comparing 5 telephone sessions of diabetes education (control condition) to 5 sessions of parental support and stress management.** Preliminary findings revealed that such an intervention is highly feasible, can favorably impact parental stress, and is well received by parents.[35] **Another effort has generated extensive preliminary data demonstrating the feasibility, satisfaction, and preliminary efficacy for using a parent-focused behavioral intervention to reduce distress in parents, and promote parents' management of their child's illness.** Specifically, Dr. Streisand (R01DK0700118) is completing a multi-site RCT evaluating parental management of young children's T1D. In this study, 134 parents were randomized in a trial in which intervention participants completed a *phone-based* 5-session intervention, including access to an Internet message board and group call. A total of 89% of participants completed all 5 sessions, and retention at one year was excellent (>89%). Preliminary findings suggest high intervention satisfaction, with significant improvements for intervention families in mealtime distress, one of the key areas targeted by intervention (Figure 5). These data demonstrate the research team's ability to successfully execute a phone-based psychosocial intervention with high levels of satisfaction and retention, as well as favorable outcomes on eating behavior and control of blood sugar.

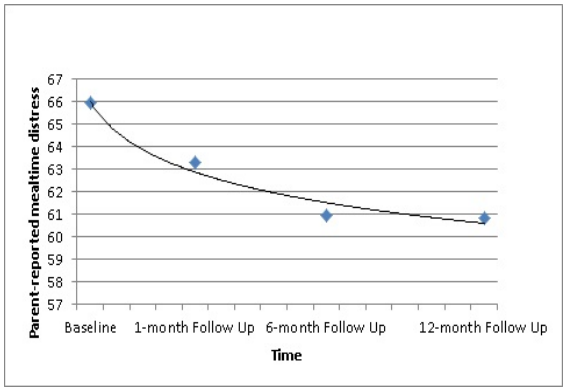

Figure 5: Change in Mealtime Distress Post-Intervention

Mobile technologies show promise in augmenting Dr. Streisand's approach. Telephone counseling has already been demonstrated as an effective and acceptable format for promoting positive psychological adjustment of parents across a broad range of pediatric medical conditions.[36,37,38,39,40] Research regarding the feasibility of mHealth technology as a mode of intervention indicates promising results among a variety of adult populations.[41,42,43] Further, several interventions that are theoretically grounded in social cognitive theory have incorporated text message components into their larger intervention.[44,45,46,47] **Dr. Streisand's team has already demonstrated**

that such technologies are a feasible means for reaching families affected by a medical condition as part of behavioral interventions to improve adherence in T1D.[48]

C.3. mHealth Technology

Mobile technologies are now pervasive among residents of disadvantaged urban communities.[31] AAs and Hispanics are more likely to own smartphones than whites, and are more likely to use their mobile phones to access health information online.[49] The latest Nielsen report indicates that 54% of AAs own a smartphone, and that they are more likely than other racial groups to use their phones for texting, email, Internet access, and social media.[50]

While national data suggests that low-income minorities frequently send/receive text messages and are receptive to receiving health information via text, Dr. Ivor Horn and her team sought to understand patterns of cell phone use and interest in mHealth technology among the general patient pool at Children's National. Her team conducted a survey with 266 parents of children (1-12 years old, covered by public insurance) receiving care at three pediatric primary care centers in Washington, DC. The survey included questions about demographics, cell phone use, Internet use, and social networking based on the Pew Internet and American Life Project Poll. This sample was composed primarily of AA (93%) and single (78%) mothers. Half had more than a high school education and incomes above $25,000 per year (58%). **96% of participants indicated they use a cell phone, and over two-thirds use their cell phones for functions other than calls (90% text).** Almost 20% send more than 50 texts per day. Those with incomes less than $25,000 were more likely to send text messages sharing information about their health than those with higher incomes. Over 80% are interested in getting health information online, via email or text message. **We are therefore confident that mHealth technology will be a feasible and valuable tool to increase the efficacy of our intervention.**

C.4. Qualitative Research in Target Population

The study team conducted formative qualitative research under IRB Pro00004728 to investigate parental report of key stressors, intervention preferences, and receptivity to mHealth interventions. A series of focus groups and one-on-one interviews were conducted with parents of children receiving asthma care in the IMPACT DC Asthma Clinic or Emergency Department. These interviews achieved thematic saturation regarding preferred intervention content and format, but showed greater variability in responses to the incorporation of technologies into the intervention.

The focus groups and interviews found that asthma is a primary stressor in many parents' lives, and the parents need coping skills to help them deal with stress on an ongoing basis rather than just letting it build up. In addition, the participants expressed a desire for more knowledge about asthma and ways to keep their children healthy. Participants highlighted the importance of relationships with interventionists and peers, and preferred face-to-face approaches for the intervention. In addition, multi-modal approaches are desired, including the opportunity to role play and learn from peers. There were highly varied preferences regarding the incorporation of mHealth communication, with some participants indicating no interest in using technology to communicate or learn, and others identifying many ways in which mHealth could be helpful. Furthermore, participants expressed that any communication via texting or other mHealth tools should be personalized and grounded in relationships, rather than impersonal or general.

In addition, the study investigators have convened a Stakeholder Engagement Core (SEC) to participate in the development of this study. Members were selected based on either professional

expertise in social, medical, legal and educational services, or experience as the parent of one or more children with asthma. The SEC has guided the study team in refining the research questions, determining patient-centered outcomes, and developing the intervention. The SEC will remain highly engaged as the study shifts from development to implementation and ultimately dissemination.

D. RESEARCH DESIGN AND METHODS

D.1. Overview of Study Design and Procedure

This study is a single blind, prospective randomized controlled trial comparing the IMPACT DC Asthma Clinic intervention of guideline-based clinical care, education, and short-term care coordination (usual care) to usual care plus parental stress management in a cohort of up to 250 parent-child dyads.

This study will employ a parallel-groups RCT design. Outcomes data will be collected by interviews at enrollment (baseline), 3 months post-enrollment, 6 months post-enrollment, and 12 months post-enrollment. The 12 month follow-up data will be collected only for a subset of participants.

D.2. Usual Care

All participants in both the usual care and intervention arms of the study will receive guideline-based asthma care in the IMPACT DC Asthma Clinic, supplemented by three months of limited care coordination services to address barriers to care.

The IMPACT DC Asthma Clinic is a fully validated and bilingual clinical intervention[33] that has operated at Children's National since 2004. It focuses on at-risk youth with an over-dependence on EDs for episodic care. It provides care to approximately 1000 new patients per year, and has won multiple national and local awards, including the EPA's 2006 National Environmental Leadership Award in Asthma Management, the 2012 DC Chartered Healthcare *"Making a Difference" Health Disparities Award,* and the 2012 DC Hospital Association *Haynes Rice Community Service Award*.

IMPACT DC's conceptual model begins with the premise that effective longitudinal asthma care is a broad continuum involving the child surrounded by his/her family, primary medical care home, hospital, ED, community pharmacist, insurance case manager, and school nurse. The vision continues with the novel idea that the ED can and should be a critical and proactive part of this continuum, particularly for children who use the ED frequently and/or are poorly connected with their medical homes. The IMPACT DC Asthma Clinic therefore targets children who are heavily dependent on EDs for episodic care. It provides a comprehensive source of asthma education, medical care, and care coordination designed to transition patients to more effective longitudinal asthma care in their primary medical care homes. Patients are referred for consultative care from EDs, inpatient units, primary clinicians, and school nurses.

By seeing the majority of children within two weeks of referral, the IMPACT DC Asthma Clinic leverages the "teachable moment." While educating families about the physiological and environmental basis of asthma, IMPACT DC stresses the importance of managing asthma as a chronic disease and emphasizes the effectiveness of combining preventative measures and longitudinal care. This, in turn, promotes self-efficacy among the child and caregivers, giving them the confidence to manage their child's asthma effectively. Each family meets with an asthma educator, clinician, and case manager. While highly individualized and based on a shared dialogue with the family and patient, the clinic's

curriculum has three fully-scripted components, as detailed the table below, which are highly reproducible and based on the NIH guidelines. Participating families report a high level of satisfaction with the Clinic.

IMPACT DC Asthma Clinic Curriculum	
KEY COMPONENTS	**EDUCATION PROVIDED**
Asthma Education: Environmental Triggers and their Control	-Basic pathophysiology of asthma with emphasis on its chronic nature -Role of the environment in asthma -Specific, individualized environmental triggers (i.e. tobacco smoke, mold, pests) -Creation of a safe sleep zone minimizing triggers
Medical Care	-Symptom recognition -Disease control with controller medications -Management of exacerbations with quick relief medications -Proper device use (i.e. spacer, diskus, nebulizer) -Completion of an Asthma Action Plan
Care Coordination	-The role and importance of longitudinal asthma care with a primary care provider -Counseling on communication strategies with PCP about asthma -Ensure school-based care through school nurses and coordinate with managed care organizations -Provision of booster calls after clinic visit to address barriers to ongoing care

D.3. Intervention

The intervention for this study is a multi-dimensional stress management program designed to be responsive to parent and other stakeholder preferences, as described in Section C.4: Qualitative Research in Target Population.

The intervention will have two separate yet coordinated components:

Intervention Component 1: One-on-one stress management sessions
Four sessions as summarized below will be delivered by a trained community wellness coach. We will aim to conduct the first two sessions in person, and to offer subsequent sessions on a weekly basis by phone. The interventionist and participant will jointly determine the optimal timeframe for completing the four sessions within 12 weeks of enrollment.

One-on-One Sessions	
Session	**Content**
1	Challenges of asthma in children and families; the role of stress and introduction of tools for stress management; breathing exercise
2	Introduction to mindfulness; meditation
3	Positive thinking, self-nurturing and relaxation exercises
4	Working together with your child in deep breathing and mindfulness Wrap up: Encourage continuing utilizing peer support.

Intervention Component 2: Peer Support

Participants will also be invited to participate in support groups conducted on a rolling basis, for up to six months after enrollment. The community wellness coaches will facilitate these sessions. A portion of each session will be devoted to content related to stress management and/or asthma management, to be provided by a clinician or community-based expert as appropriate, with the remainder of the time used for facilitated discussion and support. Topics will be announced in advance so that participants know what to expect and can bring questions if desired.

Content from the intervention sessions will be reinforced by periodic text messages and calls from the coaches, who will also encourage ongoing participation in the support groups.

Certificates will be provided to participants who complete core intervention activities to foster a sense of accomplishment and expertise.

Once control group participants have completed all study activities, they will be offered the opportunity to receive the intervention content.

D.4. Participants

We will consent a cohort of up to 400 parent-child dyads, with the goal of randomizing up to 250 dyads. Parents will be the primary targets of the intervention, and both parent and child outcomes will be assessed, as described in D.6. Outcomes.

Eligible parents will meet the following criteria:

- self-identify as African-American
- be both the legal guardian and primary asthma caregiver of an eligible child
- not have an exclusionary psychiatric condition, including but not limited to psychosis, based on the screening form at recruitment
- not be enrolled in another asthma research study

To be eligible, a child must meet the following criteria:

- parent-identified as African-American
- age 4-12 years inclusive at recruitment
- physician diagnosis of persistent asthma
- publicly financed insurance
- absence of a chronic medical condition (other than asthma) including but not limited to diabetes, sickle cell disease, heart disease, lung disease or neurological disorder
- not be enrolled in another asthma research study

In addition, the PI may choose to not include a participant if he does not believe it is in the family's best interest to participate.

D.5. Recruitment, Consent and Randomization

Trained clinical research staff will recruit eligible families from the IMPACT DC Asthma Clinic. The Clinic currently operates in the two locations of the Children's National Emergency Department – at United Medical Center in Southeast DC, and at the Sheikh Zayed campus in Northwest DC. By using the IMPACT DC Asthma Clinic as the recruitment site for this study, we will ensure that the children and families of all trial participants receive guideline-based asthma care.

After consulting with the Clinic team, study staff will approach parents to determine their interest in the study and to confirm eligibility.

In order to minimize selection bias and ensure representativeness of participants, all potentially eligible participants will be screened. Reasons for ineligibility will be tracked rigorously to allow for a clear description of the study population. In addition, parents choosing to decline participation will be asked to provide simple demographic data and reason for declining so that participation bias analyses can be conducted.

The study team has a strong record in study recruitment within our target population of disadvantaged African American families, and routinely achieves or exceeds enrollment targets. The study team will meet regularly to assess recruitment progress, and to identify and address barriers as needed. A summary of solutions to recruitment challenges is included below:

Obstacle 1: Ineligibility. Higher than expected ineligibility may prove challenging to enrolling at the target rate. Solutions include:

- Reassess recruitment sources and engage collaborators as needed to maximize availability of potentially eligible participants
- Reassess eligibility criteria to ensure appropriateness

Obstacle 2: Refusals. Families vary in their willingness to participate in research. Solutions include:

- Train research staff to appropriately present studies to families and to partner with investigators to respond to questions.
- Engage the Research Subject Advocate to empower families to make informed choices regarding research participation.

Informed Consent: Written consent will be obtained from interested study participants prior to the initiation of study activities. A single document will be used to document consent for the parents' own participation, as well as their permission for their child's participation. In addition, children age 7 and older will provide assent in accordance with Children's National's policy. The Informed Consent form that will be approved by the Children's National Health System IRB, and will supplement but not replace the dialogue between participants and research personnel. Additional requirements include:

- The Consent Form will be prepared at approximately an 8th grade reading level, with appropriate lay descriptions of technical terms wherever used.
- Participants will be allowed ample time to review the document and ask staff questions prior to deciding whether or not to participate.
- Copies of the Consent Form will be given to participants for their records.

After obtaining informed consent, study staff will administer a baseline questionnaire as described in Section D.6. Outcomes. The baseline questionnaire will be completed within ten days of consent.

Randomization: After completion of the baseline measure, the participant will be randomized to one of the study's two arms using RedCap.

Participants randomized to the intervention arm will then be provided with an orientation to the intervention, and instructed on when they will be contacted by the intervention team. These participants will also receive short-term care coordination by the IMPACT DC Asthma Clinic team

according to the Clinic's standard protocol, and will receive periodic requests for updated contact information.

Participants randomized to the control arm will receive short-term care coordination by the IMPACT DC Asthma Clinic team according to the Clinic's standard protocol, but will not receive any additional contact by the study team until the follow-up phone interviews with the exception of periodic requests for updated contact information.

D.6. Outcomes

The following domains will be assessed. Data sources will include parent report and review of the child's medical records.

Follow-up interviews will be conducted by phone by trained research assistants who are blinded to the participant's group assignment. In order to maintain this blind, the research assistants will not be involved in the randomization process, will not have access to the randomization status of participants, and will not participate in meeting during which intervention sessions are discussed with participant-specific details. Critical unblinding issues will be reported to the IRB as protocol deviations, including any instance where a follow-up interview is completed by a research staff member with prior knowledge of the participant's group assignment.

Domain	Target: Child or Parent
Parent/Child/Family Psychosocial Outcomes	
Family Stress	Parent
Parental Stress	Parent
Parental Depression	Parent
Child Anxiety	Child
Child Depression	Child
Quality of life	Parent
Caregiver smoking behavior	Parent
Coping strategies	Parent
Mindfulness	Parent
Resilience	Parent
Mediators/Moderators	
Sociodemographics	Parent, Child
Health Literacy	Parent
Home exposure to ETS	Child
Resilience	Parent
Use of existing ancillary services	Parent, Child
BMI	Child
Asthma Management/Outcomes	
Symptom-free days *(primary outcome)*	Child
Asthma morbidity	Child
Asthma severity	Child
Asthma control	Child

Asthma medications and adherence	Child
Healthcare utilization	Child
Exacerbations (measured by courses of systemic steroids)	Child
Process Outcomes	
Satisfaction	Parent

In addition, study staff will assess intervention fidelity, as well as participant uptake of the different intervention components. And we will conduct a qualitative evaluation, asking open-ended questions regarding the intervention.

The primary outcome of symptom-free days was selected in consultation with a wide range of parents and other stakeholders, including our SEC. Being healthy and able to participate fully in activities is a patient-centered goal for asthma care.

Other asthma outcomes were selected for their importance to both parents/patients and decision makers. Asthma morbidity, control, and exacerbations are of primary importance to parents, while clinicians and other decision-makers also focus on medication adherence, healthcare utilization, and exacerbations.

In addition, this study includes psychosocial outcomes of key importance to both parents and decision makers. Parents indicated a particular interest in the psychological well-being of their children, and clinicians and service providers have indicated interest in parental well-being, as this impacts a wide range of child-centered outcomes.

Analysis of the following variables is planned:

Outcome	Measure
Primary Outcome	
Symptom-free days	Days with no symptoms of asthma in prior 14d
Secondary Outcomes	
Asthma morbidity	Daytime and nighttime symptoms in prior 14d, missed school in prior 14d
Asthma severity	Asthma symptoms in prior 1m, and oral steroid use in prior year
Asthma control	Asthma symptoms in prior 1m, and oral steroid use in prior year
Asthma medications and adherence	Use of medications in prior 2d, and beliefs regarding asthma medications
Healthcare utilization	Utilization in 12m prior to enrollment and during follow-up period, including emergency department visits, hospital and ICU admissions, primary care visits, and urgent care visits.
Exacerbations	Courses of systemic steroids
Family stress	Stressful events in prior 30d
Parental stress	Perceived Stress Scale (PSS)
Parental depression	Center for Epidemiologic Studies Depression

	Scale (CES-D)
Child anxiety	PROMIS Parent Proxy Anxiety
Child depression	PROMIS Parent Proxy Depressive Symptoms
Quality of life	Pediatric Asthma Caregiver Quality of Life Questionnaire (PACQLQ)
Caregiver smoking behavior	Cigarettes smoked per day
Coping strategies	Brief COPE
Mindfulness	Interpersonal Mindfulness in Parenting
Resilience	Revised Life Orientation Test (LOT-R)
Covariates	
Sociodemographics	Race, ethnicity, family history, parent education attainment, household income
Home exposures	Exposure to environmental tobacco smoke
Health literacy	Single Item Literacy Screener (SILS)
Use of existing ancillary services	Use of other social services and participation in stress management activities
Resilience	Revised Life Orientation Test (LOT-R)
Intervention component uptake	Staff data collection
Intervention satisfaction	Satisfaction survey, qualitative evaluation
Intervention fidelity	Staff data collection
BMI	Height and weight

Additional information regarding validated measures is included below:

Validated Measure	Characteristics and References
Perceived Stress Scale (PSS)	The Perceived Stress Scale (PSS) is a widely used psychological instrument for measuring the perception of stress. It is a measure of the degree to which situations are perceived as stressful, including how unpredictable, uncontrollable, and overloaded respondents find their lives. The questions are of a general nature and hence are relatively free of content specific to any subpopulation group. Cohen, S. and Williamson, G. Perceived Stress in a Probability Sample of the United States. Spacapan, S. and Oskamp, S. (Eds.) *The Social Psychology of Health.* Newbury Park, CA: Sage, 1988.
Stressful Life Events—Rochester Youth Development Study	Stern SB, Smith CA. Family processes and delinquency in an ecological context. Social Service Review 1995;69:703-731
PROMIS Parent Proxy Depressive Symptoms and Anxiety	The Parent Proxy Depressive Symptoms and Anxiety measures were developed from the existing PROMIS pediatric self-report content domains, for use by proxy respondents when the child is unable to complete a patient reported outcome instrument. Irwin, D. E., Gross, H. E., Stucky, B. D., Thissen, D., DeWitt, E. M., Lai, J. S., Amtmann, D., Khastou, L., Varni, J. W., & DeWalt, D. A. (2012). Development of six PROMIS pediatrics proxy-report item banks. Health and

	Quality of Life Outcomes, 10 (1): 22.
Pediatric Asthma Caregiver Quality of Life Questionnaire (PACQLQ)	This is a short, readily administered instrument for assessing the impact of asthma on caregivers' and not children's QOL, which has been used in many pediatric asthma studies of diverse populations. Domain subscales include activity limitations and emotional function. The PACQLQ is very reproducible with a low within-subject variance that results in a high degree of reliability in being able to detect differences in quality of life between caregivers with different degrees of quality of life impairment. Juniper EF, Guyatt GH, Feeny DH, Ferrie PJ, Griffith LE, Townsend M. Measuring quality of life in the parents of children with asthma. Qual Life Res 1996;5(1):27-34, Epub 1996/02/01.
Center for Epidemiologic Studies Depression Scale (CES-D)	This standardized questionnaire measures severity of depressive symptoms. Items are rated on a 4 point Likert scale. CES- D has adequate test-retest reliability and correlates well with clinical ratings of depression severity. The tool is not intended as a clinical diagnostic tool, and group averages should be interpreted in terms of level of symptoms which accompany depression, not in terms of rates of illness. The CES-D has been found to have very high internal consistency and adequate test-retest repeatability. Reliability, validity, and factor structure are similar across a wide variety of demographic characteristics in the general population samples tested. Radloff L. The CES-D scale: a self-report depression scale for research in the general population. Appl Psych Meas 1977;1(3):385-401.
Single Item Literacy Screener (SILS)	The Single Item Literacy Screener (SILS) is a simple instrument designed to identify patients with limited reading ability who need help reading health-related materials. The SILS is able to determine limited reading ability in adults and allows providers to target additional assessment of health literacy skills. Morris NS, MacLean CD, Chew LD, Littenberg B. The Single Item Literacy Screener: Evaluation of a brief instrument to identify limited reading ability. *BMC Family Practice* 2006, 7:21.
Revised Life Orientation Test (LOT-R)	The LOT-R is a brief measure to assess individual differences in generalized optimism vs pessimism. This has been used in research on the behavioral, affective and health consequences of this personality variable. It has been used as a continuous dimension of variability. Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A re-evaluation of the Life Orientation Test. *Journal of Personality and Social Psychology*, 67, 1063-1078.
Brief COPE	The Brief COPE assesses coping strategies, including several responses known to be relevant to effective and ineffective coping. The Brief COPE has been used in studies of a wide range of health conditions, and examines coping in naturally occurring situations.

	Carver, C. S. (1997). You want to measure coping but your protocol's too long: Consider the Brief COPE. *International Journal of Behavioral Medicine*, 4, 92-100.
Interpersonal Mindfulness in Parenting	This measure assesses mindful parenting, which is conceptualized as a construct encompassing parent social cognitions and emotions within the parenting context. Factors include non-judgmental receptivity, nonreactivity, present-centered awareness and attention. The measure has demonstrated reliability and validity. Duncan LG, Coatsworth JD, Gayles JG, Geier MH, Greenberg MT. Can mindful parenting be observed? Relations between observational ratings of mother-youth interactions and mothers' self-report of mindful parenting. J Fam Psychol. 2015 Apr;29(2):276-82. Coatsworth JD, Duncan LG, Greenberg MT, Nix RL. Changing Parent's Mindfulness, Child Management Skills and Relationship Quality With Their Youth: Results From a Randomized Pilot Intervention Trial. J Child Fam Stud. 2010 Apr 1;19(2):203-217.

D.7. Retention and Compensation

The study team has a strong record of retention, and Dr. Teach's completed studies have had >89% success rates of phone follow-up at six months. The study team will utilize the following procedures developed for prior studies, which have been essential for high retention rates. At enrollment, the research staff will request multiple phone numbers and an email address from each participant, and will also request information on an alternate person that we may contact if we have difficulty reaching them for follow-up. This is necessary due to both the transient nature of our target population, and the fact that phone numbers are frequently disconnected and/or changed. In addition, the study team will maintain a high frequency of contact with all study participants, and regularly request updated contact information. In addition, the study team will engage families at recruitment and emphasize the importance of their ongoing participation. Finally, we will aim to minimize barriers to participation and assure that all research activities are patient- and family-centered.

Participants will receive total compensation of up to $150 for participation in the study to be dispensed as: $25 after enrollment and baseline interview, $35 after the follow-up interview at month 3 and $40 after the final interview at month 6. In addition, the subset of participants that complete an additional follow-up interview at 12 months will receive $50 in compensation. Based on previous studies conducted in our research center with similar populations, this amount should be sufficient to compensate participants for their time, but it will not be coercive, minimizing participation solely based on financial gain. Compensation will be provided in the form of gift cards. In addition, we will provide reimbursement for transportation in the form of parking vouchers or metro cards for study-related activities.

D.8. Data Management

All study data will be collected via systems created by the Biostatistics and Study Methodology Division at Children's National, and will comply with all applicable guidelines regarding research participant confidentiality and data integrity.

We will collect and manage study data using the Research Electronic Data CAPture System (REDCap) (https://redcap.vanderbilt.edu) which has been used to successfully support more than 800 single and multi-centered clinical research studies at Children's National and George Washington University as part of the collaboration between these two institutions for the Clinical and Translational Research Institute at Children's National (CTSI-CN). Data can be captured either on paper source documentation and then entered into the REDCap system or entered directly. The web-based transmission of data is encrypted and enclosed within a fire-wall.

Data will be entered into REDCap by site study staff and will then check electronically for validity against data specifications. Data exceptions (i.e., invalid values, outliers) or missing data are flagged and described to give the site coordinator an opportunity to review and make corrections or complete the data, and regular data queries will be conducted.

D.9 Staff Training and Quality Assurance

All members of the study team will complete training in human subject protections prior to participating in research activities. Required training modules accessed through the web-based Collaborative IRB Training Initiative (CITI) program have been completed by all study staff.

In addition, the principal investigator will provide his research team with ongoing training on the responsible conduct of research, with emphasis on adherence to protocol and protecting each participant's safety, rights, and welfare. As for all of the PI's studies, an atmosphere of openness and accountability is maintained, and all staff have been instructed to immediately speak with a coordinator and/or investigator if they encounter a situation in which they are unsure how to follow protocol or they identify a potential compromise to patient safety or well-being.

When protocol deviations occur, the PI and study staff will work closely with the IRB to determine the best procedure for addressing the deviation and preventing further occurrences. Regular team meetings will provide opportunities for process improvement, ongoing training and education of staff, refinement and standardization of processes, identification of potential problems, and fostering of open communication among study team members.

In addition, the principal investigator will always be available to address any problems that occur.

The community wellness coaches that implement the intervention will be selected based on prior experience promoting healthy lifestyle behaviors in community settings, including individuals with experience as a community health worker, a practitioner of complementary and integrative heath therapies. They will be employed by Children's National, and will participate training activities and ongoing supervision with our research team staff. Training will be led by Drs. Streisand and Teach, and topics will include:

- human subjects research, privacy protections, and informed consent,
- socialization with other coaches,
- an overview of this study and the role of coaches,
- coach interaction guidelines (e.g., confidentiality, rapport building, active listening,

crisis/emergency situations),
- role-playing mentorship skills, and
- an overview of participant assignment, call structure, and supervision

Emphasized throughout the training will be the supportive role of the coach, and the distinction between their role and that of a health care team provider. Coaches will be trained to *not* give any medical advice and to refer participants requesting asthma management information to their medical team. Participants will also be informed of the limitations of the role of their assigned coach.

Supervision will occur on a monthly basis with Dr. Streisand and/or Dr. Teach. This training system worked well with prior studies conducted by Dr. Streisand.

D.10. STATISTICAL ANALYSES

General Considerations

All analyses will be conducted on an intention-to-treat paradigm using all data collected. All analyses will be conducted with two-tailed α=0.05 for significance.

To address aim 1: To measure completion of the intervention's components by participants randomized to the intervention. Summary statistics of all variables will be described. For continuous variables, we will calculate the mean, median, standard deviation, minimum and maximum. For categorical variables, we calculate the count and the percentage.

To address aim 2: To determine the effect that the stress management intervention has on the primary measured outcome: symptom free days. Other patient/family-centered outcomes will include parent stress, quality of life, asthma morbidity, healthcare utilization, and medication adherence. Baseline demographic characteristics will first be compared in univariate fashion between the two groups using the chi-squared test for categorical variables and the t-test for continuous variables. If any variable is not balanced by randomization, it will be used as a covariate in all secondary analyses. To test the hypothesis that the time average of number of symptom-free days over a two week period (primary outcome) at 3 and 6 month follow-up will be significantly higher among parents in Arm 2 (intervention) than in Arm 1 (usual care), a two sample t-test will be used to compare difference of mean symptom-free days over a two week period between the two arms with point estimates, 95% CI and p values being reported. Depending on the degree of dispersion, we may need to employ a Poisson or negative binomial model.

In secondary analysis, we will further explore the effect of the intervention by fitting random effect mixed models that (1) adjust for baseline covariates of interest, considered *a priori* or that differ between groups at baseline and are relevant to change in symptom-free days; (2) test for interaction between treatment effects and other covariates; and (3) examine patients who complete intervention and follow-up (per protocol analysis).

For continuous secondary outcomes, we will use the same approach as described above. For the categorical secondary outcomes, we will use the chi square test of whether relative rates between groups differ from 1. All subsequent estimates of relative rates (RR) will be adjusted (at the minimum) for age, sex, race/ethnicity and other covariates using generalized estimating equations (GEE). All estimates of RR will be reported with 95% confidence intervals (CIs). For measures of healthcare

utilization, the analysis will compare adjusted rates and RRs at 3 and 6 follow up. Depending on the degree of dispersion in the rates, these models will be based on either Poisson or negative binomial regression models.

Sensitivity analyses will be conducted to account for missing data. These will estimate the highest and lowest potential treatment effect for primary and secondary outcomes.

Missing Data

Clinical research staff will be trained in the importance of completing all data fields. Based on our prior studies, we anticipate a rate of missing data for the primary outcome of <5%. All efforts will be made to minimize patient dropout. Frequent data queries will allow us to track missing data and retrain staff as needed. Sensitivity analyses will be conducted as described above. Reasons for participant drop out will be collected and reported. In cases of missing data, we will use multiple imputation (MI) to impute the missing values.

Sample Size Considerations: **Power Analysis**

This study is designed to detect the smallest clinically significant difference in mean symptom free days (SFD) between the intervention and control groups.

The initial sample size calculation was based on previous data from other studies, the improvements of 0.9-1.0 SFD per 14 days are feasible, the standard deviation of SFD is 2.7, and the within subject correlation is 0.3. Power analysis was calculated for the intervention effect on SFD while justifying two assessments for each subject. The table shows the total sample size needed to detect differences in SFD from 0.9 to 1.0 with different within subject correlation. The sample size of 152 is needed to detect the difference of 1.0 SFD with standard deviation of SFD of 2.7, within subject correlation of 0.3, power of 0.8 at alpha level of 0.05. With anticipation of attrition rate of 10%, we initially planned to enroll 168 children.

Power Calculation with Standard Deviation of 2.7, Power of 0.8, Alpha level of 0.5			
Difference	**Correlation**	**N**	**N (with 10% attrition)**
0.9	0.1	158	174
0.9	0.15	166	183
0.9	0.2	172	190
0.9	0.25	180	198
0.9	0.3	186	205
0.9	0.35	194	214
0.9	0.4	200	220
0.95	0.1	142	157
0.95	0.15	148	163
0.95	0.2	156	172
0.95	0.25	162	179
0.95	0.3	168	185
0.95	0.35	174	192
0.95	0.4	180	198
1	0.1	128	141
1	0.15	134	148
1	0.2	140	154
1	0.25	146	161
1	**0.3**	**152**	**168**
1	0.35	158	174
1	0.4	164	181

The sample size was recalculated on September 14, 2015, based on the baseline data collected from the first 60 participants, which showed the following: mean was 10.25 days, median was 11.5 days, standard deviation was 4.12. The sample distribution is not normal and approximated a Poisson distribution. Based on this distribution, the calculated sample size is 188, as can achieve 80% power at a 0.05 significance level to detect a response rate ratio of 1.15 with baseline response rate 0.8. Therefore, with 10% percent attrition rate, we now plan to enroll 207 participants.

Feasibility

The IMPACT DC Asthma Clinic sees approximately 1200 new patients per year. Of these, we estimate that at least 30% of patients (n=360) will meet all eligibility requirements and that at least 70% of their

parents will agree to participate. These estimates yield a rate of enrollment of approximately 250 participants per 12 months.

Proposed Timeline

The timeline below shows the progression of each participant through the trial activities. Shaded cells apply only to the intervention group. The 12 month interview will only be conducted for a subset of participants.

Activity by Month	0	1	2	3	4	5	6	7	8	9	10	11	12
IMPACT DC Asthma Clinic Visit	X												
Screening	X												
Consent	X												
Baseline Interview	X												
Randomization	X												
IMPACT DC Care Coordination (both study arms)		X	X	X									
Intervention: One-on-One Sessions		X	X	X									
Intervention: Peer Support		X	X	X	X	X	X						
Follow Up Interviews (Blinded)				X			X						X

HISTORICAL CONTROLS:

To allow for additional comparisons of the study participants, we seek to collect data from the electronic medical record about a sample of participants as similar as possible to those enrolled in the trial. Specifically, we will identify a consecutive case series of participants seen in the IMPACT DC Asthma Clinic in the 12 months prior to the start of enrollment in this trial. We will include English-speaking participants age 4-12y with public insurance and persistent asthma, and will use available data in the medical record to exclude those that are not African American or have significant medical comorbidities. We will compare their health care utilization before and after receiving care in the IMPACT DC Asthma Clinic to those participants enrolled in the trial.

E. STUDY POPULATION –(GENDER AND MINORITY INCLUSIONS):

Inclusion of Women and Minorities

We will enroll without regard to gender. Based on the population receiving care in the IMPACT DC Asthma Clinic, as well as prior studies, we anticipate that approximately 75% of parents will be female.

We propose to enroll participants that self-identify as African-American. This population has been identified as a high-risk subgroup, and account for approximately 95% of the families receiving care in the IMPACT DC Asthma Clinic. This study is specifically aiming to reduce racial health disparities.

Inclusion of Children

This study will enroll parents-child dyads. Parent participants must have children age 4-12y receiving care in the IMPACT DC Asthma Clinic. Parents are the target of the intervention, as parental stress has been demonstrated to impact pediatric asthma outcomes. And we have deliberately chosen to include only parents of children age 4-12y for two reasons:

1. Below the age of 4 years, the diagnosis of asthma can be uncertain, and many young children who wheeze have *"transient wheezing of childhood"* that later resolves. Further, the effectiveness of ICS is less certain in this age group.
2. Above the age of 12 years, the locus of control for administration of medication has shifted from the parent to the adolescent, rendering our planned intervention targeting parents less impactful.

F. RISKS AND SIDE EFFECTS

The primary risk to participation in this study is breach of confidentiality.

In addition, while there are no known psychological risks to subjects when completing interviews or filling out standardized psychological questionnaires, the questions may make the subjects feel uncomfortable in that they ask about their physical and psychological health. It is possible that subjects could feel mental fatigue, embarrassment, a sense of invasion of privacy, and/or frustration from recalling traumatic or distressing events that relate to their personal stress experiences.

The alternative to participation in this project is for parents to not participate.

F.1. MEASURES TAKEN TO MINIMIZE RISKS AND SIDE EFFECTS:

Protection Against Risk of Loss of Confidentiality: As the primary risk to study participation is breach of confidentiality, study staff is trained in procedures for maintaining the security and confidentiality of data. All paper files will be in a locked cabinet in a secure suite on a secure floor in the Children's Research Institute. Any materials containing research subject names will always be stored separately from associated data to preclude the inadvertent linking of confidential or sensitive information to an individual research subject. All records will be stripped of names and be provided with a unique "research" ID. Study databases will be password-protected and maintained on secure servers, and all staff will be trained on the importance of maintaining the confidentiality of study data.

Project findings and reports prepared for dissemination will not contain information that could reasonably be used to identify an individual. Individual data will not be shared outside of research staff, although data summaries will be made available to partners, including the Stakeholder Engagement Core and National Advisory Core, who will assist the study team in interpreting and disseminating the findings. One exception is if a participant reports the intention to harm him or herself or others. Researchers will report any evidence of abuse or neglect to appropriate authorities.

Referrals for Depression or Concern for Other Serious Mental Health Issues: Given the high rate of depression in our target population, we will provide a list of mental health resources to all participants at enrollment. For participants whose questionnaire responses indicate that they are experiencing a clinically significant level of depressive symptoms (CES-D 10 score ≥11 or PROMIS parent proxy depressive symptoms t-score ≥70), we will follow a protocol that has been effective in prior studies conducted by co-Investigator Randi Streisand, PhD. Specifically, all psychological forms will be reviewed by one of study staff or investigators within 24 hours of completion and flagged if the depression score is significant. The research staff reviewing scores will immediately alert the PI and Dr. Streisand. If it is the first elevated score for a participant, Dr. Streisand or Dr. Teach will call the participant to explore referral for services. For subsequent elevated scores, Dr. Streisand and Dr. Teach will be notified, and will determine whether another call to the participant is needed.

A similar process will be followed if the research staff identifies other mental health concerns or safety concerns.

In addition, participants will be reminded at the time of the interview that they do not have to answer any questions that make them uncomfortable.

G. BENEFITS

There are no clear direct benefits to participants for participating in this study. The study team may learn more about managing stress among parents of children with asthma that may benefit other parents in the future and improve child asthma outcomes.

H. DATA AND SAFETY MONITORING PLAN

Study monitoring

Safety monitoring will be performed by the PI and the study coordinator on an ongoing basis. The PI will be responsible for evaluating any unanticipated problems and determining whether they affect the risk/benefit ratio of the study and whether modifications to the protocol and consent forms are required. Unanticipated problems to be assessed include adverse events, deviations from the study design or protocol, problems with informed consent, and confidentiality violations. The PI will report unanticipated problems to the Children's National IRB in accordance with IRB policy. The IRB will review such cases and determine what actions must be taken to address or resolve the situation.

In addition, as required by PCORI, the study's funder, the principal investigator will convene a Data and Safety Monitoring Board (DSMB). The DSMB will conduct safety monitoring and monitoring of data integrity issues for the study. It will be the responsibility of the DSMB to review relevant safety data for each enrolled participant, and to make recommendations regarding the ongoing conduct and monitoring of studies.

The DSMB will meet at least every six months, in person, by phone or by webinar, and will be comprised of at least four members who are independent from the study. Membership will include two medical professionals, a trained patient or stakeholder representative and a statistician. Data will be compiled by the study data manager and presented to the DSMB in a format that allows for complete review of all safety data and study progress data (participant enrollment, data completion and quality). The DSMB will also review any adverse event reports and make recommendations for follow-up or further action. The DSMB will receive and respond to reports of any serious adverse events (SAEs) and will be immediately notified of fatal or life-threatening events. Based on the review of safety, efficacy, and performance data, the DSMB will make recommendations regarding conduct of the study. Biannual data and safety monitoring reports will be submitted to PCORI within two weeks of convening the DSMB

Minimizing research-associated risk

As described above, the primary risk to study participation is breach of confidentiality. Study staff will be trained in procedures for maintaining the security and confidentiality of data, and protocols will be in place to minimize risk of breach of confidentiality from paper or electronic records. Individual data will not be shared outside of research staff, and only data summaries will be made available to partners. One exception is if a participant reports the intention to harm him or herself or others. Researchers will report any evidence of abuse or neglect to appropriate authorities.

In addition, protocols will be implemented to address any responses by participants indicating that they are experiencing a clinically significant level of depressive symptoms or if the research staff identifies other mental health concerns or safety concerns.

Participants will be reminded at the time of the interview that they do not have to answer any questions that make them uncomfortable.

Identifying, reviewing, and reporting adverse events and unanticipated problems to the IRB

All members of the study team will be trained in identifying adverse events and unanticipated problems. These will be reviewed by the principal investigator or co-investigator, both of whom have significant experience in patient-centered research. The IRB will be provided with reports of all adverse events and unanticipated problems, including the resulting action plan if applicable.

Any injury or harm to a study participant that is possibly related to the study intervention will be treated as an AE or SAE. Emergency department visits and hospital admissions for asthma will not be considered AEs or SAEs, as they are expected in the target population and will be tracked as outcomes. Suicide or attempted suicide will be considered an SAE. Any death, regardless of relatedness to study intervention, will be reported as an SAE.

Assuring data accuracy and protocol compliance

The study team will regularly review study processes and determine whether retraining is needed in any areas. Fidelity checklists will be utilized for both data collection and intervention protocols, and the principal investigator and co-investigator will provide ongoing supervision of staff. Data queries will be addressed in a timely manner, and retraining in data collection and data entry will be conducted as needs are identified. Any challenges identified in assuring data accuracy and protocol compliance will be reported to both the DSMB and PCORI.

I. OUTSIDE CONSULTANTS/COLLABORATORS

This project will be conducted with a number of collaborator's outside of Children's National, including:

Cynthia Rand, PhD: Dr. Rand is the Director of the Johns Hopkins Adherence Research Center, and a Professor of Medicine at the Johns Hopkins University. She is a nationally recognized expert in stress and adherence, especially in asthma and in disadvantaged populations.

Ivor Horn, MD, MPH: Dr. Ivor Horn is the Medical Director at the Center for Diversity and Health Equity and Professor of Pediatrics at the University of Washington School of Medicine. Dr. Horn provides expertise in both disparities research and the use of mHealth in minority populations.

Kabir Yadav, MD: Dr. Yadav is a board-certified Clinical Informaticist and Associate Professor of Emergency Medicine at the University of California Los Angeles. He provides expertise in the use of technology in clinical interventions.

J. CONTRACTUAL AGREEMENTS

None.

K. COSTS TO SUBJECTS

There will be no costs to the subjects' insurance for their participation. Some participants may incur financial costs of phone usage for the calls and/or text messages, which will be offset by compensation in the form of gift cards.

L. CONFLICTS OF INTEREST

None.

M. CONFIDENTIALITY

We will keep the records of this study confidential. Only the people working on the study will be able to access patient information. Results from this study made public will be presented as a summary of data and no individual will ever be referred to specifically. All tracking sheets will be stored in locked offices and filing cabinets belonging to study staff. Electronic data will be available on individually secured PCs or by password only on central servers. Passwords will be distributed only to study staff. All paper data will be stored in secured fashion for a minimum of two years after study completion.

N. SUBJECT REIMBURSEMENT

Participants will receive total compensation of up to $150 for participation in the study to be dispensed as: $25 after enrollment and baseline interview, $35 after the follow-up interview at month 3 and $40 after the final interview at month 6. In addition, the subset of participants that complete another follow-up interview at 12 months will receive $50 in compensation. Based on previous studies conducted in our research center with similar populations, this amount should be sufficient to compensate participants for their time, but it will not be coercive, minimizing participation solely based on financial gain. Compensation will be provided in the form of gift cards.

O. FACILITIES AND EQUIPMENT

The Center for Translational Science at Children's National Medical Center provides office space and secure storage space for the study team.

P. APPENDICES

None.

Q. REFERENCES & LITERATURE CITED

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