APPLICATION FOR FEDERAL ASSISTANCE

SF 424 R&R

3. DATE RECEIVED BY STATE	State Application Identifier

1. TYPE OF SUBMISSION

❍Pre-application ●Application ❍Changed/Corrected Application

2. DATE SUBMITTED | **Applicant Identifier**

4. a. Federal Identifier

b. Agency Routing Identifier

c. Previous Grants.gov Tracking ID

5. APPLICANT INFORMATION **Organizational DUNS:** 608195277

Legal Name: University of North Carolina at Chapel Hill

Department: Division:

Street1: 104 Airport Drive Street2: Campus Box 1350

City: Chapel Hill County/Parish: Orange State: NC: North Carolina

Province: Country: USA: UNITED STATES ZIP / Postal Code: 27599-1350

Person to be contacted on matters involving this application

Prefix: First Name: Esther Middle Name: Last Name: Thompson Suffix:

Position/Title: Sponsored Project Specialist

Street1: 104 Airport Drive, Suite 2200 Street2: CB#1350

City: Chapel Hill County/Parish: Orange State: NC: North Carolina

Province: Country: USA: UNITED STATES ZIP / Postal Code: 27599-1350

Phone Number: (919) 962-4246 Fax Number: (919)962-5011 Email: esther09@email.unc.edu

6. EMPLOYER IDENTIFICATION NUMBER*(EIN) or (TIN)*: 1-566001393-A1

7. TYPE OF APPLICANT: H: Public/State Controlled Institution of Higher Education

Other (Specify):

Small Business Organization Type ❍Women Owned ❍Socially and Economically Disadvantaged

8. TYPE OF APPLICATION:

●New ❍Resubmission

❍Renewal ❍Continuation ❍Revision

If Revision, mark appropriate box(es).

❍A. Increase Award ❍B. Decrease Award ❍C. Increase Duration

❍D. Decrease Duration ❍E. Other*(specify)*:

Is this application being submitted to other agencies? ❍ Yes ● No What other Agencies?

9. NAME OF FEDERAL AGENCY:

National Institutes of Health

10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER:

TITLE:

11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT:

The Role of Social Adversity on Trajectories of Child Emotional Health Regulation

12. PROPOSED PROJECT:

Start Date: 07/01/2021 Ending Date: 12/31/2023

13. CONGRESSIONAL DISTRICT OF THE APPLICANT:

NC-004

14. PROJECT DIRECTOR/PRINCIPAL INVESTIGATOR CONTACT INFORMATION

Prefix:	First Name:	Middle Name:	Last Name:	Suffix:
	Harry		Adynski	

Position/Title: Doctoral Student
Organization Name: University of North Carolina at Chapel Hill
Department: School of Nursing
Division:
Street1: 106 Kiley Street
Street2:
City: Chapel Hill
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15. ESTIMATED PROJECT FUNDING

a. Total Federal Funds Requested	$63,027.00
b. Total Non-Federal Funds	$0.00
c. Total Federal & Non-Federal Funds	$63,027.00
d. Estimated Program Income	$0.00

16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?

a. YES ❍ THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON:

DATE:

b. NO ● PROGRAM IS NOT COVERED BY E.O. 12372; OR

❍ PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW

17. By signing this application, I certify (1) to the statements contained in the list of certifications* and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances * and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 18, Section 1001)

● I agree

The list of certifications and assurances, or an Internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

18. SFLLL or other Explanatory Documentation. File Name: Mime Type:

19. Authorized Representative

Prefix:	First Name:	Middle Name:	Last Name:	Suffix:
	Terry	R	Magnuson	

Position/Title: Vice Chancellor for Research
Organization Name: University of North Carolina at Chapel Hill
Department: Office of Sponsored Research
Division:
Street1: 104 Airport Dr. Ste. 2200
Street2: CB 1350
City: Chapel Hill
County/Parish: Orange
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Country: USA: UNITED STATES
ZIP / Postal Code: 27599-1350
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Fax Number: (919) 962-5011
Email: resadminosr@unc.edu

Signature of Authorized Representative **Date Signed**

20. Pre-application File Name: Mime Type:

21. Cover Letter Attachment File Name: Adynski_CoverLetterrev1046480222.pdf Mime Type: application/pdf

UNC
SCHOOL OF NURSING

THE UNIVERSITY
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November 23, 2020

Center for Scientific Review
National Institutes of Health
6701 Rockledge Drive, Suite 1040
MSC 7710
Bethesda, MD 20892-7710

To Members of the NIH Extramural Grants Office,

Please find enclosed an application prepared in response to Funding Opportunity Announcement PA-21-051 Ruth L. Kirschstein National Research Service Award (NRSA) Individual Predoctoral Fellowship (Parent F31). The title of our proposal is "*The Role of Social Adversity on Trajectories of Child Emotional Health Regulation".*

The overall goal of this application is to investigate the role of social adversity as an early driver of emerging trajectories of emotional health regulation from infancy into early childhood on related functional outcomes at school entry (academic performance). Furthermore, we will explore potential mediating factors (maternal executive functioning and parenting sensitivity) that can be used for nursing intervention development to promote child emotional health and well-being. My multidisciplinary mentorship team across nursing, medicine, public health, and psychology have assisted in the development of this proposal and training plan. This proposal and accompanying training plan will support my development toward becoming an independent nurse scientist dedicated to minimizing the effects of social adversity on child health and well-being.

Reference Letters are for this proposal have been provided by:

Dr. Shawn Kneipp	(School of Nursing, UNC-Chapel Hill)
Dr. Ashley Leak Bryant	(School of Nursing, UNC-Chapel Hill)
Dr. Cheryl Jones	(School of Nursing, UNC-Chapel Hill)
Dr. Cathy Zimmer	(Odum Institute for Research in Social Science/Adjunct Faculty in Sociology, UNC-Chapel Hill)

My team and I have been in contact with Dr. David Banks PhD, MPH, RN, Program Director, Division of Extramural Science programs, National Institute of Nursing Research (NINR), National Institutes of Health. Dr. Banks expressed interest in our proposal and encouraged submission.

Sincerely,

Harry Adynski, BSN, RN
PhD Student in Nursing
UNC at Chapel Hill
Hillman Scholar in Nursing Innovation

Project/Performance Site Location(s)

Project/Performance Site Primary Location

Organization Name: University of North Carolina at Chapel Hill

* Street1: 104 Airport Drive		Street2: Campus Box 1350
* City: Chapel Hill	County: Orange	* State: NC: North Carolina
Province:	* Country: USA: UNITED STATES	* Zip / Postal Code: 27599-1350
DUNS Number: 608195277	* Project/Performance Site Congressional District: NC-004	

File Name	Mime Type

Additional Location(s)

RESEARCH & RELATED Other Project Information

1. * Are Human Subjects Involved? ● Yes ❍ No

1.a. If YES to Human Subjects

Is the Project Exempt from Federal regulations? ● Yes ❍ No

If yes, check appropriate exemption number

Exemption Number: _ 1 _ 2 _ 3 ✔ 4 _ 5 _ 6 _ 7 _ 8

If no, is the IRB review Pending? ❍ Yes ❍ No

IRB Approval Date:

Human Subject Assurance Number 00004801

2. * Are Vertebrate Animals Used? ❍ Yes ● No

2.a. If YES to Vertebrate Animals

Is the IACUC review Pending? ❍ Yes ❍ No

IACUC Approval Date:

Animal Welfare Assurance Number

3. * Is proprietary/privileged information included in the application? ❍ Yes ● No

4.a. * Does the Project have an Actual or Perceived Impact – positive or negative – on the environment? ❍ Yes ● No

4.b. If yes, please explain:

4.c. If this project has an actual or potential impact on the environment, has an exemption been authorized or an environmental assessment (EA) or environmental impact statement (EIS) been performed? ❍ Yes ❍ No

4.d. If yes, please explain:

5.a. * Is the research performance site designated, or eligible to be designated, as a historic place? ❍ Yes ● No

5.b. If yes, please explain:

6.a. * Does this project involve activities outside the U.S. or partnership with International Collaborators? ❍ Yes ● No

6.b. If yes, identify countries:

6.c. Optional Explanation:

7. Project Summary/Abstract	Adynski_Abstract1046480170.pdf	Mime Type: application/pdf
8. Project Narrative	Adynski_ProjectNarrative1046480171.pdf	Mime Type: application/pdf
9. Bibliography & References Cited	Adynski_Bibliography1046480184.pdf	Mime Type: application/pdf
10. Facilities & Other Resources	Adynski_Facilities1046480172.pdf	Mime Type: application/pdf
11. Equipment	Adynski_Equipment1046480173.pdf	Mime Type: application/pdf

ABSTRACT

Emotional health regulation, the ability to manage attention, affect and behavior, is directly related to long term maintenance of health behaviors making it a cornerstone for wellness and wellbeing across the lifespan. However, children who experience social adversity, such as low socioeconomic status, are at heightened risk for experiencing emotional health problems. By preschool age, estimates indicate that one in five children experience emotional health dysregulation, which lead to risky behaviors, impaired relationships, psychopathology, and physical illness across the lifespan. Thus, school entry is a critical point for identification of emotional health problems as caregivers, teachers, and school nurses can be strategically positioned to conduct screening and interventions. To inform effective screening and intervention, we need to better understand the role of social adversity on emotional health regulation trajectories and its relationship with functional outcomes at school entry, such as academic performance. Additionally, because child emotional regulation is directly affected by caregiving, we also need to explore modifiable maternal characteristics including maternal executive functioning and parenting sensitivity which could be targeted for future intervention to promote child wellness. In this NRSA F31 proposal, using rich longitudinal data from the Durham Child Health and Development Study, I will adopt the Developmental Origins of Health and Disease framework to address the following **specific aims**: **1)** Determine early life social adversity's effect on emotional health regulation trajectories from ages 0 to 3 years; **2)** Determine whether emotional health regulation trajectories associate with academic performance outcomes at school entry (kindergarten, 1st grade); and **3)** Identify whether modifiable maternal characteristics (i.e. executive function and parenting sensitivity) mediate the association of (a) social adversity to emotional health regulation trajectories, and (b) emotional health regulation trajectories to academic performance. The accompanying **career development plan** will provide the foundation for me to **a)** expand expertise in the effects of early life adversity on child development and emotional health regulation; **b)** develop methodological and analytic skills in longitudinal approaches; **c)** acquire knowledge in evidence-based nursing intervention development and clinical translation; **d)** expand career development and team science skills. I have a strong and highly successful mentorship team that is dedicated to my growth and development and will guide me throughout this award. Together, the career development and research plan will support my development as an independent nursing scientist in the area of social adversity, child health and well-being. This proposal aligns with the wellness focus of the NINR Strategic Plan. This study will generate important knowledge related to the conditions in which childhood emotional health dysregulation arise and identify potential modifiable factors that myself and others can use to inform nursing child-parent interventions.

PROJECT NARRATIVE

Emotional health regulation, the ability to manage attention, affect and behavior, is a cornerstone for wellness and wellbeing across the lifespan. This project will explore the role of early life social adversity on trajectories of child emotional health regulation across early childhood, related functional outcome at school entry (academic performance), and potential mediating factors (maternal executive functioning and parenting sensitivity) that can be used for nursing intervention development to promote child emotional health and well-being. This award will support my development toward becoming an independent nurse scientist dedicated to minimizing the effects of social adversity on child health and well-being.

BIBLIOGRAPHY

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FACILITIES AND OTHER RESOURCES

The University of North Carolina at Chapel Hill (UNC-CH) and the School of Nursing (SON) offer a scientific environment that supports the success of the proposed training award and many other grants across campus. Dr. Santos (co-sponsor and dissertation chair) is an assistant professor within the SON, the interim director of the Biobehavioral Laboratory, and the Director of the Training & Mentorship Division within UNC Institute for Environmental Health Solutions within Gillings School of Global Public Health. Dr. Santos has a strong relationship with the SON Research Support Center (RSC), Carolina Consortium on Human Development, the Frank Porter Graham Child Development Institute, North Carolina Translational and Clinical Sciences Institute (NC TraCS), and the Odum Institute for Research in Social Science at UNC-CH. The SON is located centrally among other health sciences (Medicine, Pharmacy, Public Health, and Social Work), which encourages collaboration and inter-disciplinary cooperation in research. Mr. Adynski's multidisciplinary mentorship team reflects the diverse interdisciplinary opportunities within UNC-CH as his mentors Dr. Propper (co-sponsor), Dr. Beeber (mentor), Dr. Gilmore (mentor), Dr. Zou (mentor) are from nursing, psychology, medicine, and public health.

SCHOOL OF NURSING

Overview
The UNC School of Nursing (SON) at UNC-Chapel Hill is nationally recognized as one of the premiere nursing schools in the country, with a tri-fold mission of excellence in nursing education, research and practice. A primary focus of the research in the School of Nursing is the developing and testing of interventions to prevent and manage illness with an emphasis on reducing health disparities and on incorporating biobehavioral measures. The School supports pre- and post-doctoral training in this focus area through its **T32 on Preventing and Managing Chronic Illness (T32 NR007091),** which has been continuously funded since 1995. The School of Nursing also has a focus on health systems research, which includes an emphasis on improving healthcare quality and on implementation science. As detailed below, the school has a breadth of resources available to support faculty and doctoral students' research. **Mr. Adynski has completed his undergraduate bachelor's in science in Nursing and required PhD Core Nursing coursework.** Dr. Santos (co-sponsor) is an assistant professor and a faculty member within the SON T32 and Dr. Beeber (mentor) is a professor and the Associate Dean of the PhD Program and Division within UNC's SON. Dr. Zou (mentor) holds a joint faculty role within the SON and Department of Biostatistics within Gilling's School of Global Public Health. **Mr. Adynski has proposed coursework aligned with the UNC SON T32 program to further develop intervention and translational science skills.**

Physical Facilities: The SON building is located in Carrington Hall, a building with approximately 141,500 (152,000 sf gross, 89,000 sf assignable to the SON) square feet of space that includes faculty and post-doctoral fellow offices, doctoral student carrels, administrative areas, conference rooms, classrooms ranging in size from 10 to 280 seats (6 to 225), computer labs, research project space, a Biobehavioral Laboratory, and skills lab facilities. Two floors (approximately 10,000 gross square feet each) are devoted to research support and funded project space. The research space has been designed with "suites" for small to large projects, archiving space and access to the Office of Research Support and Consultation personnel. Research suites range in size from 150 to1020 square feet.
Office Space for Pre- and Post-Doctoral trainees: Pre-doctoral trainees are each provided a study carrel in offices in Carrington Hall (SON). Each trainee's space is equipped with a desk, file cabinet, and high-end computer. Computers are replaced approximately every three years. Centralized printing facilities are available proximal to the carrels. Research assistants in the Office of Research Support and Consultation provide advice on use of statistical packages. Mr. Adynski has an assigned research carrel as an office with a computer provided, as well as access to Dr. Santos' research project space that he will use for research activities throughout this award.

The Office of Research Support and Consultation
The SON's Office of Research Support and Consultation (RSC) facilitates the research endeavors of faculty, students, and post-doctoral fellows. The RSC provides a broad array of research support services, including consultation in the areas of research design and measurement; statistical analysis, including advanced techniques such as structural equation modeling, mixed models, longitudinal analyses, and analysis of complex

data structures; analysis programming; preparation of research grant proposals and assistance with institutional grant processing; editorial assistance for grant proposals and research articles; and a bi-weekly research seminar series and periodic statistical methods short courses. The RSC maintains information on funding sources, research conferences, and faculty research interests, and publishes a newsletter highlighting grant and conference opportunities, research and computing news, and faculty research activities. The RSC also manages School-awarded small grants programs. **Mr. Adynski received support from RSC staff in preparing and submitting this application and will continue to use RSC services for post-award management. Mr. Adynski will continue to attend the bi-weekly research seminars hosted by the RSC through the proposed training period.**

School of Nursing Office of Information & Instructional Technologies

School of Nursing Information & Instructional Technologies (IIT) provides comprehensive hardware, software, database and classroom and instructional technology support and services to faculty, staff, and students. Services support the mission of the School and are targeted to the specific needs of the community. Furthermore, SON IIT services compliment and extend core technology offerings of the University' central IT organization, Information Technology Services (ITS). As part of the campus Windows Server/Active Directory implementation, SON IIT provides file and print services, software, databases and individual and shared storage using numerous SON virtual and physical servers. All SON faculty, staff, post-doctoral trainees and doctoral students have desktop computers from which they can access SON, UNC campus and Internet services and resources, and movement among those three environments is seamless. **Mr. Adynski will meet with SON IIT security staff to receive training to ensure data security and encryption of any laptop used under the current award, and to coordinate secure storage of data on the SON IIT server**.

University of North Carolina at Chapel Hill

UNC-CH Libraries

The UNC library system, which is consistently ranked among the top university libraries in North America, consists of over a dozen libraries that support the University's academic and professional programs. Campus libraries broadly cover the fine arts, the biomedical, health, and physical sciences, humanities, law, and social sciences. The combined book and serial volumes held exceeds 8,200,000 (including 1.5 million e-books); 5.2 million microforms; 1.6 million government publications; 496,684 audiovisuals; 287,600 maps; and 2.4 million graphic items. In addition to providing users with an array of informational, instructional, and research resources, the libraries offer a wide range of reference and referral services. This library system also houses the Health Sciences Library.

UNC-CH Health Sciences Library

The Health Sciences Library (HSL) is ranked among the top academic health sciences libraries in the nation, and it is one of the largest of its type in the U.S. as measured by square footage, number of staff, and expenditures. The HSL serves the health information needs of the entire university with more than 293,000 print and non-print titles and access to over 200 electronic databases. There is an exceptional collection of over 8,500 electronic serial publications, over 18,000 electronic books, over 4,600 streaming video titles, and over 457,000 total print volumes. The HSL is a Resource Library for the National Network of Libraries of Medicine, meaning that it participates in national and international interlibrary loan consortia. This participation allows the Library to borrow materials quickly from other libraries around the nation and the world. The Health Sciences librarians offer a variety of customized services, including extensive literature searches, online and face-to-face education, online self-help guides, on-site office hours, support for web-based and instructional technology projects, and connections to campus resources and expertise. The HSL offers courses in research software such as citation managers (e.g., Endnote) and tools for literature reviews (e.g., Covidence). A collaborative relationship between the UNC-CH, Duke University, and North Carolina State University makes the resources of all three library systems available to faculty and students on each campus. These resources are accessible and searchable through the Internet from faculty and staff offices within the SON. **Mr. Adynski has used the HSL resources and collaborated with the designated nursing research librarian in his studies thus far and will continue to seek guidance where necessary.**

Research Institutes/Centers/Consortia
The University is home to over 90 research institutes and centers and numerous specialized research laboratories and consortia.

The North Carolina Translational and Clinical Sciences Institute (NC TraCS)
NC TraCS is the academic home of the NIH Clinical and Translational Science Award (CTSA) of the University of North Carolina at Chapel Hill (UNC). NC TraCS is the central translational and clinical research resource for UNC and the state of North Carolina. Funded in 2008, with renewed funding from the NIH National Center for Advancing Translational Sciences (NCATS) for a second award cycle (2013-2018), NC TraCS supports translatable research along every point of the research cycle--from discovery to application, to dissemination, to practice and policy change, and back to rediscovery. It continues to transform clinical and translational science by creating a research trajectory that is a continuous process of knowledge creation, testing, dissemination, and implementation grounded in the health and healthcare needs of communities across North Carolina. NC TraCS accomplishes these objectives by maintaining seamless research support and administrative connections among its resources and services, including the Education Program, each providing special expertise, unique research facilities, and the tools necessary to support research from basic science discovery to practice and health policy translation. **Mr. Adynski has used NC TraCS training courses in the Responsible Conduct of Research Course. Dr. Linda Beeber (mentor) is the UNC School of Nursing Liaison to NC TraCS and will guide Mr. Adynski to further resources within NCTraCS to develop translational and clinical research science skills.**

University Research Support Offices
The Vice Chancellor for Research and Economic Development oversees the university units that provide support for research. The **Office of Human Research Ethics** (OHRE) is responsible for ethical and regulatory oversight of research at the University of North Carolina at Chapel Hill that involves human subjects. OHRE supports and oversees the work of the Institutional Review Boards (IRBs) with the goal of maximizing protection of human research subjects. The **Office of Sponsored Research** (OSR) assists in all aspects of the research administration of externally funded research. OSR assists with managing proposals and awards, monitoring and reporting personnel time on grants, training and development for personnel involved in research administration, and overseeing regulatory compliance. **The Office of Clinical Trials** (OCT) performs all administrative, legal, and pre-award budgetary functions for clinical trials. **Mr. Adynski will continue to receive proper training and collaboration with the university units to ensure ethical training and oversight of the proposed award.**

Frank Porter Graham Child Development Center
The Frank Porter Graham Child Development Institute (FPG) was founded in 1966 at the University of North Carolina at Chapel Hill. FPG is one of the oldest multidisciplinary centers devoted to the study of children and families. Most of the institute's work addresses young children ages birth through eight years. It is dedicated to improving the lives of young children and their families through research, teaching, and public service. Teaching and technical assistance activities prepare professionals to serve children and families effectively. Public service activities translate and spread knowledge to families, practitioners, and policy makers. The institute currently supports over 50 projects working across the nation and around the world. Researchers focus on parent and family support; early care and education; child health and development; early identification and intervention; equity, access and inclusion; and early childhood policy. **Dr. Propper is a senior research scientist within FPG. Drs. Santos, Beeber, and Gilmore all have collaborated on their projects within FPG. Mr. Adynski's research team will assist him utilizing the resources within FPG to advance child development and longitudinal research skills.**

The Center for Developmental Sciences
The mission of The Center for Developmental Sciences is "to promote the interdisciplinary study of developmental theory and longitudinal methods." The center aims to transcend the limitations of institutional and disciplinary divisions in order to facilitate scholarship and collaboration among faculty and young scientists. The faculty of the Center for Developmental Science consists primarily of scientists from Duke University, University of North Carolina at Chapel Hill, Meredith College, North Carolina State University, University of North Carolina at Greensboro, and North Carolina Central University. Selected researchers from other institutions collaborate in research initiated by the Center. Center faculty specialize in anthropology, behavioral genetics, developmental psychology, developmental psychobiology, education, epidemiology, experimental psychology, internal

medicine, behavioral neurobiology, nursing, pediatrics, psychiatry, public health, and sociology. The Center has three branches: the **Carolina Consortium on Human Development**, the Behavioral Science Research Division, and the Social Development Research Division.

Carolina Consortium on Human Development

The Carolina Consortium on Human Development (CCHD) was established to promote the interdisciplinary study of developmental science, in order to transcend the usual limitations of institutional structure and discipline divisions and promote collaborative research among faculty and young scientists. The CCHD training program focuses on longitudinal methodology and analysis, on the social ecology of development, and on the educational and health implications of behavioral study from infancy through adolescence and mid-life. The CCHD conducts a basic program of proseminars, workshops, special colloquia, and weekly Fellows seminars. The three-fold concerns of the program are training at the postdoctoral and advanced predoctoral levels, interdisciplinary discussion and scientific support among Consortium members, and research collaboration among faculty on issues of developmental analysis and longitudinal study. Financial support for the activities of the Consortium have been obtained through a grant from the National Institute of Child Health and Human Development and the Offices of the Provost and Vice-Chancellor of the University of North Carolina at Chapel Hill. **Dr. Propper (co-sponsor) is the co-PI and co-Director of the Carolina Consortium on Human Development and the NICHD T32 Training Program: Human Development: Interdisciplinary Research Training (5T32HD007376-30). Dr. Santos (co-sponsor) is a member of the T32 Executive Committee of the Carolina Consortium on Human Development. Mr. Adynski will attend seminars offered by the Carolina Consortium on Human Development and take the T32 proseminar course to further develop developmental science knowledge and skills.**

Odum Institute for Research in Social Science

The Odum Institute offers services to support the research and training of social science faculty and graduate students such as data archives, consultation on survey methodology, and computing and statistical services. The Institute maintains the country's third-largest archive of computer-readable social science data. Holdings include national and international economic, electoral, demographic, financial, health, public opinion, and other types of data to meet a variety of research and teaching needs. The Institute provides consultation in survey methodology, construction of measurement instruments, sample design, and selection of appropriate data collection methods, especially the use of personal, telephone, and mail surveys. The Institute's statistical and computing services include short courses and individual consultation in data analysis, data management, programming, and use of hardware. The Odum Institute's Computer Laboratory provides access to computing software, hardware, and expertise in data analysis. **Mr. Adynski has used The Odum Institute previously for statistical support in his undergraduate honors thesis and has planned short courses to further develop his data management as well as longitudinal methodology and analysis skills.**

UNC Department of Psychology and Neuroscience

The mission of the Department of Psychology and Neuroscience is to engage in psychological research and scholarship of the highest quality and to provide excellent teaching and service, informed and enhanced by our efforts to discover, synthesize, and transmit knowledge. The core mission of the department is a strong commitment to be the driving force in emerging areas for psychology and innovative connections with other disciplines. The PhD program in psychology is designed to provide students with the knowledge, skills, and judgement needed to become active contributors at the highest level to research, teach, and provide public and professional service in the community. The doctoral degree qualifies our graduates to become faculty members, researchers, licensed clinical psychologists, or policy-makers and administrators in fields related to psychology. They offer the doctoral degree with training in six core areas of psychology: behavioral and integrative neuroscience, clinical psychology, cognitive psychology, developmental psychology, quantitative psychology, and social psychology. **Dr. Propper is an adjunct associate professor within the Department of Psychology and Neuroscience. Mr. Adynski completed his undergraduate Bachelor's in Science in this department and took courses across the six core areas and has planned coursework to further develop developmental science skills.**

UNC-CH Gilling's School of Global Public Health

The Gillings School of Global Public Health at UNC-CH is the second leading public health institution in the nation according to the latest U.S. News and World Report. UNC-CH School of Public Health is ranked first

among schools of public health at public universities by the same report. The Gillings School's 221 full-time faculty are nationally and internationally recognized for their research, publications, and public health service. The "pursuit of excellence" is the byword for the School, as it strives to fulfill its mission to improve the health and wellbeing of the population through research. This Gillings School specializes in a variety of areas, including addressing health disparities and chronic illness and strives for interdisciplinary collaboration. Part of the school's mission is to disseminate and implement effective health solutions in populations facing resounding public health challenges, and the faculty, staff, and students frequently work with individuals from surrounding professional programs, including medicine, pharmacy, dentistry, and nursing, to achieve this goal. The Gillings School of Global Public Health is comprised of eight departments/units, including Epidemiology, Health Policy and Management, Biostatistics, and Maternal and Child Health. The Gillings School also sponsors more than 20 specialized centers and institutes focused on critical areas of public health. **Dr. Santos (mentor) is involved with Gillings School of Global Public Health as the Director of the Training & Mentorship Division within UNC Institute for Environmental Health Solutions. Dr. Zou (mentor) holds a joint faculty position within the Department of Biostatistics and SON. Mr. Adynski has completed coursework within the Department of Health Policy Management in translational health disparities.**

EQUIPMENT

N/A

RESEARCH & RELATED Senior/Key Person Profile (Expanded)

PROFILE - Project Director/Principal Investigator

Prefix: | First Name*: Harry | Middle Name | Last Name*: Adynski | Suffix:

Position/Title*: Doctoral Student
Organization Name*: University of North Carolina at Chapel Hill
Department: School of Nursing
Division:
Street1*: 106 Kiley Street
Street2:
City*: Chapel Hill
County: Orange
State*: NC: North Carolina
Province:
Country*: USA: UNITED STATES
Zip / Postal Code*: 27516-0000

Phone Number*: (717) 659-9416 | Fax Number: | E-Mail*: hradams@live.unc.edu

Credential, e.g., agency login: HARRY_ADYNSKI

Project Role*: PD/PI | Other Project Role Category:

Degree Type: BS, BSN | Degree Year: 2018

	File Name
Attach Biographical Sketch*:	Adynski_BiosketchAdynski1046543573.pdf
Attach Current & Pending Support:	

PROFILE - Senior/Key Person

Prefix: | First Name*: Hudson | Middle Name | Last Name*: Santos | Suffix:

Position/Title*: Assistant Professor
Organization Name*: University of North Carolina at Chapel Hill
Department: School of Nursing
Division:
Street1*: 513 Carrington Hall
Street2: CB# 7460
City*: Chapel Hill
County: Orange
State*: NC: North Carolina
Province:
Country*: USA: UNITED STATES
Zip / Postal Code*: 27599-7460

Phone Number*: 919) 966-9483 | Fax Number: | E-Mail*: hsantosj@email.unc.edu

Credential, e.g., agency login: hudson.santos

Project Role*: Other (Specify) | Other Project Role Category: Sponsor

Degree Type: | Degree Year:

	File Name
Attach Biographical Sketch*:	Adynski_BiosketchSantos1046543574.pdf
Attach Current & Pending Support:	

PROFILE - Senior/Key Person

Prefix: | First Name*: Cathi | Middle Name B | Last Name*: Propper | Suffix:

Position/Title*:	Research Asst Prof, Research Scientist
Organization Name*:	University of North Carolina at Chapel Hill
Department:	Ctr for Developmental Science
Division:	
Street1*:	100 E. Franklin St
Street2:	CB# 8115
City*:	Chapel Hill
County:	Orange
State*:	NC: North Carolina
Province:	
Country*:	USA: UNITED STATES
Zip / Postal Code*:	27599-8115

Phone Number*: (919) 843-2400 | Fax Number: | E-Mail*: propper@email.unc.edu

Credential, e.g., agency login: PROPPER

Project Role*: Other (Specify) | Other Project Role Category: Co-Sponsor

Degree Type: | Degree Year:

	File Name
Attach Biographical Sketch*:	Adynski_BiosketchPropper1046543575.pdf
Attach Current & Pending Support:	

PROFILE - Senior/Key Person

Prefix: | First Name*: John | Middle Name H | Last Name*: Gilmore | Suffix:

Position/Title*:	Distinguished Professor
Organization Name*:	University of North Carolina at Chapel Hill
Department:	Psychiatry
Division:	
Street1*:	7025A Neurosciees Hosp
Street2:	CB# 7160
City*:	Chapel Hill
County:	Orange
State*:	NC: North Carolina
Province:	
Country*:	USA: UNITED STATES
Zip / Postal Code*:	27599-7160

Phone Number*: (919) 966-6971 | Fax Number: | E-Mail*: john_gilmore@med.unc.edu

Credential, e.g., agency login:

Project Role*: Other (Specify) | Other Project Role Category: Committee Member

Degree Type: | Degree Year:

	File Name
Attach Biographical Sketch*:	Adynski_BiosketchGilmore1046543576.pdf
Attach Current & Pending Support:	

PROFILE - Senior/Key Person

Prefix: | First Name*: Linda | Middle Name S | Last Name*: Beeber | Suffix:

Position/Title*:	Professor
Organization Name*:	University of North Carolina at Chapel Hill
Department:	School of Nursing
Division:	
Street1*:	4007 Carrington Hall

Street2:	CB# 7460
City*:	Chapel Hill
County:	Orange
State*:	NC: North Carolina
Province:	
Country*:	USA: UNITED STATES
Zip / Postal Code*:	27599-7460

Phone Number*: (919) 966-8148 | Fax Number: | E-Mail*: beeber@email.unc.edu

Credential, e.g., agency login:

Project Role*: Other (Specify) | Other Project Role Category: Committee Member

Degree Type: | Degree Year:

	File Name
Attach Biographical Sketch*:	Adynski_BiosketchBeeber1046543578.pdf
Attach Current & Pending Support:	

PROFILE - Senior/Key Person

Prefix: | First Name*: Baiming | Middle Name | Last Name*: Zou | Suffix:

Position/Title*:	Assistant Professor
Organization Name*:	University of North Carolina at Chapel Hill
Department:	School of Nursing
Division:	
Street1*:	2009 Carrington Hall
Street2:	CB#7460
City*:	Chapel Hill
County:	Orange
State*:	NC: North Carolina
Province:	
Country*:	USA: UNITED STATES
Zip / Postal Code*:	27599-7460

Phone Number*: (919) 843-8552 | Fax Number: | E-Mail*: bzou@email.unc.edu

Credential, e.g., agency login:

Project Role*: Other (Specify) | Other Project Role Category: Statistician and Committee Member

Degree Type: | Degree Year:

	File Name
Attach Biographical Sketch*:	Adynski_BiosketchZou1046543579.pdf
Attach Current & Pending Support:	

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Adynski, Harry

eRA COMMONS USER NAME (credential, e.g., agency login): Harry_Adynski

POSITION TITLE: Pre-Doctoral Trainee

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Start Date MM/YYYY	Completion Date MM/YYYY	FIELD OF STUDY
University of North Carolina at Chapel Hill	BS, BSN	8/2011	5/2018	Psychology, Nursing
University of North Carolina at Chapel Hill,	PhD (Expected)	7/2018	12/2022	Nursing

A. Personal Statement

My ultimate career goal is to successfully lead an interdisciplinary research team in a research-intensive university with a research program that explores the interaction between social adversity and child health and development**. This role would allow me to advance the understanding of early child development, emotional health, and well-being to promote wellness and health equity** to prevent or reduce poor health outcomes related to social adversity through intervention development. An essential first step in reaching this goal is completing the proposed training plan to better understand the longitudinal impact of social adversity and maternal characteristics on emotional health dysregulation across early childhood. This proposal will help identify the conditions in which disruptions occur in child development and serve to inform evidence-based nursing interventions that aim to promote positive child health and well-being among at risk populations. This NRSA award would allow me to progress towards becoming an independent nurse researcher by fostering my skills, expertise, and professional development. My previous academic achievements and scholarly productivity are evidence of my potential to become an independent nurse scientist. During my undergraduate studies in nursing I was accepted into the Hillman Scholars Program in Nursing Innovation an integrated BSN to PhD program which provides mentorship opportunities from NIH-funded researchers. The Hillman Scholars Program has provided me extensive opportunities in developing research, leadership, and clinical skills to pursue a career in academia. As a Hillman Scholar, I began and accelerated my doctoral training during my BSN program by collaborating with my dissertation chair Dr. Hudson Santos and taking graduate level coursework. This allowed me to immerse myself in individual and multidisciplinary research opportunities during my undergraduate nursing studies. The integration and mentorship of the Hillman Scholars Program allowed me to develop my own research and clinical practice skills as well as meet and collaborate with my multidisciplinary mentorship team across nursing (Drs. Santos, co-sponsor; Beeber, dissertation committee member; Zou, dissertation committee member), psychology (Dr. Propper, co-sponsor) and medicine (Dr. Gilmore, dissertation committee member). I will work extensively with my mentor team to complete my training plan and dissertation work. Through this proposal I will work towards **advancing the science of early child development, emotional health, and well-being to promote wellness and health equity.** The mentorship, scientific training, and professional development that I will receive under this proposed award will allow me to progress in my development into an independent nurse scientist at a research-intensive university.

1. **Adynski, H.,** Schwartz, T., Santos Jr, HP. (2020). Does participation in food benefit programs reduce the risk for depressive symptoms?. *Journal of the American Psychiatric Nurses Association*. In Press. PMCID: N/A.

2. Salomon RE, Tan KR, Vaughan A, **Adynski H**, Muscatell KA. Minimally-invasive methods for examining biological changes in response to chronic stress: A scoping review. *International Journal of Nursing Studies*. 2020;103:103419. Epub 2020/01/17. doi: 10.1016/j.ijnurstu.2019.103419. PMCID: PMC7067628.
3. **Adynski H**, Zimmer C, Thorp J, Jr., Santos HP, Jr. Predictors of psychological distress in low-income mothers over the first postpartum year. *Research in Nursing & Health*. 2019;42(3):205-16. Epub 2019/03/20. doi: 10.1002/nur.21943. PMCID: PMC6472896.

B. Positions and Honors

Positions and Employment

2016	Research Assistant, Department of Psychology, Developmental Social Neuroscience Lab, University of North Carolina, Chapel Hill (UNC-CH), North Carolina
2016-2018	Nursing Assistant II, Inpatient Float Pool, UNC Medical Center
2018-	Clinical Nurse II, Charge Nurse, Neuroscience Hospital, UNC Medical Center

Other Experience and Professional Membership

2016-	Member, Academy Health
2018-	Member, American Psychiatric Nurses Association
2018-	Member, Sigma Theta Tau International Honors Society in Nursing
2018-	Member, American Nursing Association, member
2018-	Member, North Carolina Nurses Association, member
2019-	Psychiatric Service Line Representative, Nursing Research Council, UNC Medical Cente
2020	Member, Council for the Advancement of Nursing Science

Honors

2011-2016	Atlantic Coast Conference Academic Honor Roll
2015-2018	Dean's List Recipient, 5 semesters, UNC-CH
2015-2016	Varsity Fencing Team Scholarship Athlete, UNC-CH
2016-2018	James M Johnston Undergraduate Nursing Scholar, UNC-CH
2016-2018	Katherine Wilson Memorial Scholarship Recipient, UNC-CH
2016-2017	Cronenwett Global Health Scholar, UNC-CH
2016-	Hillman Scholars Program for Nursing Innovation, BSN-PhD UNC-CH
2018	Honors of Highest Distinction in Nursing, UNC-CH
2018-2019	James M Johnston Graduate Nursing Scholar, UNC-CH
2019-2020	North Carolina Excellence Fellowship, UNC-CH

C. Contributions to Science

1. Nursing, Social Determinants of Health, and Psychological Distress

Through my experiences as an undergraduate student in psychology and nursing at UNC-CH I began developing my research skills. Through my Research Assistant position in the Developmental Neuroscience Lab on *Project Neuroteen* (5R01DA039923-05, PI Telzer); I gained experience in recruitment and data management. When I was accepted into the Hillman Scholars Program I began working with my co-sponsor and dissertation chair Dr. Hudson Santos who guided me from formulation to dissemination of my honors thesis "Predictors of psychological distress in low-income mothers over the first postpartum year", published in *Nursing in Research & Health*. Within this manuscript, I used data collected by the NIH's Child Community Health Network to conduct multiple generalized linear mixed models exploring the extent to which social determinants of health and allostatic load score, a 10-item index of biologic indicators of chronic stress, predicted psychological distress (stress, depression, and anxiety symptoms) in low-income pregnant women over the first postpartum year. This project allowed me to further develop and integrate my research interests including the role of exploring modifiable risk factors, social determinants of health, biological indicators, and psychological distress. Through my developing interest in social determinants of health, I then developed a second manuscript entitled "Does participation in food benefit programs reduce the risk for depressive symptoms?" published in the *Journal of American Psychiatric Nurses Association*. The study utilized secondary data from the Center for Disease and

Control and Prevention Nutritional Health and Nutrition Examination Survey a nationally representative US survey to conduct logistic regression models. This manuscript built off the findings of my honors thesis exploring the role of food benefit programing (Supplemental Nutrition Assistance Plan (SNAP) and Women, Infant, and Children (WIC)) on risk for depression. Findings from this work revealed that high levels of food insecurity were significantly associated with elevated risk for depressive symptoms, while participation in food benefit programming was not. I have been able to disseminate the work at national level conferences (Academy Health, Council for the Advancement of Nursing Science).

1. **Adynski H**, Zimmer C, Thorp J, Jr., Santos HP, Jr. Predictors of psychological distress in low-income mothers over the first postpartum year. *Research in Nursing & Health*. 2019;42(3):205-16. Epub 2019/03/20. doi: 10.1002/nur.21943. PMCID: PMC6472896.
2. **Adynski, H.,** Schwartz, T., Santos Jr, HP. (2020). Does participation in food benefit programs reduce the risk for depressive symptoms?. *Journal of the American Psychiatric Nurses Association*. In Press. PMCID: N/A.

2. Nursing and Biological Indicators

During my undergraduate RA position, in the Developmental Neuroscience Lab, I was initially exposed to integrating biological and psychological research. My role in this lab working on *Project Neuroteen* 5R01DA039923-05, PI Telzer) a longitudinal study exploring the role of adolescent peers and parents on neurobiological development during adolescence, included assistance with facilitating neuroimaging and stress hormones experimental protocols. In my honors thesis, Predictors of psychological distress in low-income mothers over the first postpartum year," I integrated the exploration of both social determinants of health with biological indicators and published in *Nursing in Research & Health*. I was able to integrate both social determinants of health as well as biological indicators by exploring the role of allostatic load a 10-item index of biologic indicators of chronic stress on risk for psychological distress (stress, depression, and anxiety symptoms. The biological indicators included in the allostatic load composite were Body Mass Index, High-Density Lipoproteins (HDL), total cholesterol/HDL ratio, Heart rate, systolic blood pressure, waist-hip ratio, diastolic blood pressure, hemoglobin A1C, C-reactive protein, and diurnal cortisol. Through this project I found that allostatic load was not significantly associated with increased risk for psychological distress and explored the strengths and limitations of using a composite allostatic load measure. Additionally, I assisted in a scoping review entitled "Minimally-invasive methods for examining biological changes in response to chronic stress: A scoping review," (published in *International Journal of Nursing Studies*). This paper uniquely contributed to science by providing nurses a practical guide to using biological indicators identified by the National Institute of Nursing Research as common data elements. **Finally** with my mentor Dr. Santos, I worked as the second author in a manuscript entitled "Biopsychosocial correlates to psychological distress in Latina mothers" (under review in *Journal of Affective Disorders*), which explored the associations between psychological distress, social factors (e.g., discrimination, economic hardship) and DNA methylation of stress-related genes.

1. **Adynski H**, Zimmer C, Thorp J, Jr., Santos HP, Jr. Predictors of psychological distress in low-income mothers over the first postpartum year. *Research in Nursing & Health*. 2019;42(3):205-16. Epub 2019/03/20. doi: 10.1002/nur.21943. PMCID: PMC6472896.
2. Salomon RE, Tan KR, Vaughan A, **Adynski H**, Muscatell KA. Minimally-invasive methods for examining biological changes in response to chronic stress: A scoping review. *International Journal of Nursing Studies*. 2020;103:103419. Epub 2020/01/17. doi: 10.1016/j.ijnurstu.2019.103419. PMCID: PMC7067628.

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

Title	PI	Years of Support
Carolina Excellence Fellowship	**UNC-Graduate School**	**2018-2019**

I was nominated for the Carolina Excellence Fellowship by the School of Nursing and was selected from across a pool of applicants within all UNC-CH graduate school programs. Fellows are chosen based upon students promise in scholarship, policy, innovation and strong academic performance. This fellowship provided me one year of funding support including tuition, stipend, and health insurance.

Role: Pre-Doctoral Student

Rita and Alex Hillman Foundation	**Jones (PI)**	**2016-**

The Hillman Scholars in Nursing Innovation is a bridge BSN-PhD program designed to foster the development of independent nurse innovators who will be leaders dedicated to improving healthcare. Hillman scholars, competitively selected, are funded during the undergraduate BSN program throughout their PhD studies. Scholars receive a small amount of funds for research-related expenses.

Role: Hillman Scholar in Nursing Innovation

Scholastic Performance

YEAR	COURSE TITLE	GRADE
	University of North Carolina at Chapel Hill (BS)	
2011	MATH231 (York College of PA): Calculus I	TR, A
2011	MAT232 (York College of PA): Calculus II	TR, A
2011	PHL 115 (York College of PA) Introduction to Philosophy	TR, B,
2011	HIST151 (York College of PA): History of Western Civilization	TR, A
2011	STOR 151: Basic Statistics	A
2011	CHEM 101: General Descriptive Chemistry	C
2011	ENGL 101: English Composition and Rhetoric	A
2011	ENGL 68: Radical American Writers	A-
2012	ECON 101: Introduction to Economics	B
2012	POLI 100: Introduction to American Government	B-
2012	ENGL 102: English Composition and Rhetoric	A
2012	DRAM 115: Perspectives in Drama	A
2012	LFIT 109: Lifetime Fitness	A
2012	BIOL 101: Introduction to Biology	A-
2012	BIOL 101L: Introduction to Biology Lab	A
2012	PSYC 101: General Psychology	A
2012	ECON 410: Microeconomic Theory	C
2012	ANTH 101: General Anthropology	A-
2012	STOR 155: Introduction to Statistics	A
2013	FREN 101: Elementary French I	C
2013	PSYC 220: Biopsychology	B
2013	MUSC 145: Introduction to Jazz	A-
2013	AFRI 262: African Literature	A-
2013	PSYC 210: Statistical Principles in Psychological Research	A
2013	PLCY 210 Policy Innovation and Analysis	B+
2014	CHEM101 (Millersville University): General Descriptive Chemistry I	A-
2014	CHEM101L (Millersville University): General Descriptive Chemistry I Lab	A-
2014	CHEM102 (Millersville University): General Descriptive Chemistry II	A-
2014	CHEM 102L (Millersville University): General Descriptive Chemistry II Lab	A-
2014	PSYC250 (Millersville University): Lifespan Human Development	A
2014	BIO252: Human Anatomy and Physiology	C+
2014	MCRO251: Introduction to Medical Microbiology	B-
2014	ENGL 284: Reading Children's Literature	A-
2014	PHYC 124: Communication in Healthcare	A
2015	PSYC 502: Psychology of Adulthood and Aging	A
2015	PSYC 242: Intro to Clinical Psychology	A
2015	PSYC 270: Laboratory Research in Psychology	A-
2015	PSYC 490: History of Neuroscience	A
2015	MHCH 680 Global Sexual and Reproductive Health	A
2015	BIO252: Human Anatomy and Physiology	B
2015	PSYCH 11003E (University of Glasgow): Health Psychology	A1, TR
2015	PSYCH 11102E (University of Glasgow): What Can Psychology Tell us About Disability?	A1, TR
2015	PSYCH 4008 (University of Glasgow): Perception and Visual Cognition	B2, TR
2015	PSYCH 4051 (University of Glasgow): Atypical Development	B2, TR
2015	LATIN2001 (University of Glasgow): Latin 2A	C3, TR
2016	PSYC 230: Introduction to Cognitive Psychology	A
2016	PSYC 245: Abnormal Psychology	A

2016	PSYC 468: Family as a Context for Development	A
2016	PHYI 202: Introduction to Physiology	A-
2016	PUBH 420: AIDS Principles & Policy	A
	University of North Carolina at Chapel Hill (BSN)	
2016	NURS 254: Nursing Disciplines 1	A
2016	NURS 261: Nutrition	A
2016	NURS 361: Pathophysiology	A-
2016	NURS 366: Health Assessment	A
2016	NURS 253: Individual Development	PL
2016	NURS 360: Concepts and Skills	A
2017	NURS 362: Pharmacology	A
2017	NURS 364: Nursing Care for Adults 1	A
2017	NURS 477: Psych Mental Health Nursing	A
2017	NURS 479 Maternity and Newborn Nursing	A-
2017	NURS 382 Family Genomic Care	A
2017	NURS 675: Hillman Scholars Seminar	A
2017	HFHK15 (Jönköping University): Nursing Science, Focusing on Health and Ill-health in Children	A, TR
2017	HHIB19 (Jönköping University): Health Care Improvement	A, TR
2017	NURS 489: Global Health Experience	TR
2017	NURS 496: Health Services Improvement Work Experience	TR
2017	NURS 675: Hillman Scholars Seminar	A
2017	NURS 470: Public Health Nursing	A
2017	NURS 472: Nursing Children and Families	A-
2017	NURS 671 Nursing Inquiry and Advanced Scholarship	A-
2017	NURS 691H: Honors in Nursing I	A
2018	NURS 675: Hillman Scholars Seminar	A
2018	NURS 488 Leadership in Organizations	A
2018	NURS 591: Nursing Care for Adults II	B+
2018	NURS692H: Honors in Nursing II	A
	University of North Carolina at Chapel Hill (PhD)	
2018	NURS985: Research Seminar and Practicum	P
2018	NURS 675: Hillman Scholars Seminar	H
2018	NURS 901 Clinical Scholars in Nursing I	H
2018	NURS 962: Conducting Systematic Reviews	H
2018	NURS 976: Issues in Sampling and Design	P
2019	NURS 675: Hillman Scholars Seminar	H
2019	PSYC 868: Seminar in Social Psychology “Social Psychobiology”	P
2019	NURS 902 Clinical Scholars in Nursing II	H
2019	NURS 972 Statistical Models for Health Research	H
2019	NURS985: Research Seminar and Practicum	P
2019	NURS 675: Hillman Scholars Seminar	H
2019	NURS 912: Theoretical Foundations of Scientific Inquiry	H
2019	NURS 963: Writing for Publication	H
2019	NURS 978: Principles of Measurement	H
2020	NURS 675: Hillman Scholars Seminar	H
2020	NURS 959: Research Grant Writing	P
2020	NURS 977: Qualitative Approaches to Knowledge Development	P
2020	HPM 830: Translational Health Disparities: Research, Practice & Policy	H
2020	NURS 968: Writing the Pre-Doctoral Training Plan for a Research-Intensive Career	H

TR = Transfer Credit, PL = Placement

York College of Pennsylvania, Millersville University, UNC-CH BS grading: 93-100 = A, UNC-CH BSN grading 95-100=A

University of North Carolina at Chapel Hill PhD grading scale: high pass = H, pass = P, low pass = L.

University of Glasgow (A-G): A1-A5= Excellent, B1-B3=Very Good, C1-C3=Good, D1-D3=Satisfactory, E1-E3=Weak, F1-F3 = Poor, G1-G2 Very Poor

Jönköping University: (A-E) A=Excellent, B= Very Good, C=Good, D= Satisfactory, E Sufficient

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Santos, Hudson

eRA COMMONS USER NAME (credential, e.g., agency login): hudson.santos

POSITION TITLE: Assistant Professor of Nursing; Director, UNC Biobehavioral Laboratory Core; Director, Training & Mentorship Division for the UNC Institute for Environmental Health Solutions

EDUCATION/TRAINING:

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
State University of Paraiba	BSN	10/2009	Nursing
University of Sao Paulo	PhD	01/2013	Nursing Research
Duke University	Postdoctoral Fellow	07/2015	Longitudinal & Bioinformatics Research

A. Personal Statement

This application is for the predoctoral training for Harry Adysnki RN, BSN. His overall research interest is in exploring the role of social adversity on early child development, health, and well-being among vulnerable populations. I serve as Mr. Adynski's dissertation chair and co-sponsor of this grant. I am an Assistant Professor, Director of the Biobehavioral Laboratory Core at the University of North Carolina (UNC) at Chapel Hill School of Nursing, and Director of Training & Mentorship Division for the Institute for Environmental Health Solutions, UNC Gillings School of Global Public Health. I am an expert in socioenvironmental factors, early life stressors, and genomics related to child neurodevelopment in at-risk populations. I am the PI of three NIH funded studies (R01NR019245, R03HD101413, and K23NR017898). These studies focus on developmental outcomes among extremely preterm children, and related socioenvironmental factors and genetic and epigenetics mechanisms. I am a Co-Investigator in the Extremely Low Gestational Age Newborns (ELGAN) cohort study, which is part of the Environmental influences of Child Health Outcomes (ECHO) Consortium (UH3OD023348). My work has focused on innovative longitudinal methodology to explore risk stratification allowing for the development and or optimization of early risk mitigating interventions to improve quality of life for children. I have a track record of research and publication well suited for the proposed study and training with the needed expertise in social adversity and longitudinal methodology. I have experience in mentoring graduate students (currently 3 PhD students), and as a faculty collaborator in funded NRSAs. Furthermore, I am a core faculty member of UNC's School of Nursing T32 program in intervention research training (5T32NR007091-25), and the T32 on Human Development and Interdisciplinary Research Training (5T32HD0073676-30). I have guided Mr. Adynski in developing his own research projects through his honors thesis and coursework, which have resulted in two first authored manuscripts. Additionally, I have integrated him into my ongoing research projects and encouraged him to collaborate within our strong multidisciplinary research network. Given my background, I am ideally suited to serve as co-sponsor role within the mentoring team of Mr. Adynski. I am committed to Mr. Adynski's training and will meet with him weekly to support his development into an independent scientist.

1. **Santos HP Jr,** Yang Q, Docherty S, White-Traut R, Holditch-Davis D. (2016). Relationship of maternal psychological distress classes to later mother–infant interaction, home environment, and infant development in preterm infants. *Research in Nursing & Health*, 39(3):175-86. doi:10.1002/nur.21719. PMCID: PMC5531175.
2. Pittet F, van Caenegem N, Hicks-Nelson AR, **Santos HP Jr**, Bradburn S, Murgatroyd C, Nephew B. (2019). Maternal social environment affects offspring cognition through behavioural and immune pathways in rats. *Journal of Neuroendocrinology*, e12711 doi: 10.1111/jne.12711. PMCID: In process.
3. Bangma J, Kwiatkowski E, Psioda M, **Santos HP Jr,** Hooper SR, Douglass L, Joseph RM, Frazier J, Kuban KC, O'Shea TM, Fry RC. (2019). Early life antecedents of positive child health among 10-year-old children

born extremely preterm. *Pediatric Research*. *Pediatric Research*. 86 (6), 758-765. doi:10.1038/s41390-019-0404-x. PMCID: PMC6802282.

4. **Santos HP Jr**, Bhattacharya A, Martin EM, Addo K, Psioda M, Smeester L, Joseph RM, Hooper SR, Frazier J, Kuban KC, O'Shea TM, Fry RC, for the ELGAN Investigators (2019). Epigenome-wide DNA methylation in placentas from preterm infants: Association with maternal socioeconomic status. *Epigenetics*, 14(8):751-765. doi: 10.1080/15592294.2019.1614743. PMCID: PMC6615526.

B. Positions and Honors

Positions and Employment

2009 - 2010	Staff Nurse, Community Mental Health Clinic
2009 - 2010	Staff Nurse, State General Hospital, Psychiatry Unit
2010 - 2011	Research Assistant, University of Sao Paulo, School of Nursing
2011 - 2012	Visiting Scholar, University of North Carolina at Chapel Hill, School of Nursing
2012 - 2012	Visiting Scholar, University of British Columbia, School of Nursing, Vancouver
2013 - 2015	Post-Doctoral Associate, Duke University, School of Nursing, Durham
2015 -	Assistant Professor, University of North Carolina at Chapel Hill, School of Nursing
2016 – 2020	Advisory Board Member, UNC Biobehavioral Laboratory
2018 -	Director of Training & Mentorship Division, UNC Institute for Environmental Health Solutions, Gillings School of Global Public Health
2018 -	Member, PhD Executive Committee, UNC School of Nursing
2019 -	UNC Faculty Council – Voting member
2019 -	Member, Executive Committee for the T32 Carolina Consortium on Human Development
2020 -	Council Member-Elect, the United States Developmental Origins of Health and Disease (DOHaD) Society
2020 -	Director, UNC Biobehavioral Laboratory Core

Other Experience and Professional Memberships

2012 - 2013	Student Representative, PhD Program, University of Sao Paulo
2012 -	Member, The Marcé Society for Perinatal Mental Health
2014 - 2016	Center Investigator, P30 Center of Excellence for Cognitive/Affective Symptom Science. Duke University School of Nursing
2014 -	Southern Nursing Research Society
2016 -	Member, Alpha Alpha Chapter of Sigma Theta Tau International
2016 -	Member, Council for the Advancement of Nursing Science
2018 -	Member, NIH Strategic Working Group on Genetics and Epigenetics in the ECHO Program
2018 -	Member, International Society of Nurses in Genetics (ISONG)
2018 -	Academic Editor, PLOS ONE
2018	Reviewer, NIMHD Research Conference Grant (R13 applications)
2019 -	Reviewer, NIMHD Career Awards Grant Review Panel (K applications)
	Reviewer, Netherlands Organization for Scientific Research (NWO), Innovational Research Incentives Scheme Veni grant, Social Sciences and Humanities Board

Honors

2007, 2008	Jane da Fonseca Proença Award – Research Excellence in Psychiatric Nursing, Mental Health and Interpersonal Relationships, Brazilian Association of Nursing
2009	Excellence Research Honor, State University of Paraiba
2010	Honors Doctorate Scholarship, Sao Paulo Research Foundation
2012	Honors Doctorate Scholarship – Research Internship Abroad, Sao Paulo Research Foundation
2015	Emerging Nurse Scholar, Lawrence S. Bloomberg Faculty of Nursing, University of Toronto
2016	Abstract of Distinction, State of the Science Congress on Nursing Research, Council for the Advancement of Nursing Science
2017	NIMHD Health Disparities Research Institute (HDRI) Scholar
2019	Scholar, Summer Institute on Biological Approaches in the Social Sciences, Northwestern University
2019	Reviewers' choice abstract, International Society for Nurses in Genetics Congress, San Antonio, Texas

2020 Best Oral Presentation Award, Society for Maternal-Fetal Medicine 40th Annual Pregnancy Meeting, Texas

C. Contributions to Science

1. **Child health and neurodevelopmental outcomes**: I have devoted substantial time to study long-term outcomes of children born at risk for adverse neurodevelopmental outcomes. My expertise focuses on social and biological antecedents of child health and adverse neurocognitive outcomes. I am particularly interested in children born preterm, because they are at high risk for adverse health outcomes over time. Of note, I am Co-Investigator on the Extremely Low Gestational Age Newborns (ELGAN) study, a large longitudinal epidemiological cohort study of at-risk children, work that has advanced our understanding significantly of the neurodevelopmental status of children born preterm.
   a. **Santos HP Jr**, Yang Q, Docherty S, White-Traut R, Holditch-Davis D. (2016). Relationship of maternal psychological distress classes to later mother–infant interaction, home environment, and infant development in preterm infants. *Research in Nursing & Health*, 39(3):175-86. doi:10.1002/nur.21719. PMCID: PMC5531175.
   b. Freitas P, Kimoro A, **Santos HP Jr**, Holditch-Davis D. (2017). Biobehavioral responses of preterm infants to conventional and swaddled tub baths: A randomized crossover trial. *Journal of Perinatal and Neonatal Nursing*, 32(4):358-365. doi: 10.1097/jpn.0000000000000336. PMCID: N/A.
   c. Bangma J, Kwiatkowski E, Psioda M, **Santos HP Jr**, Hooper SR, Douglas L, Joseph RM, Frazier J, Kuban KC, O'Shea TM, Fry RC. (2018). Assessing positive child health among individuals born extremely preterm. *Journal of Pediatrics*, 202:44-49. doi: 10.1016/j.jpeds.2018.06.037. PMCID: PMC6456448.
   d. Bangma J, Kwiatkowski E, Psioda M, **Santos HP Jr**, Hooper SR, Douglas L, Joseph RM, Frazier J, Kuban KC, O'Shea TM, Fry RC. (2019). Early life antecedents of positive child health index among 10-year-old children born extremely preterm. *Pediatric Research*. 86 (6), 758-765. doi:10.1038/s41390-019-0404-x. PMCID: PMC6802282.

2. **Identification of developmental origins of child neurodevelopment**: In my work over the last five years, I have focused on genomic mechanisms of child neurodevelopment. My overall goal is to identify epigenetic markers early in life to predict later life neurodevelopmental outcomes, and for use as potential screening biomarkers and/or molecular targets for interventions. Most of our team's current work concentrates on the placenta in population-based work. We have identified several findings related to epigenetic markers that are predictive of child health and neurodevelopmental outcomes among extremely preterm children.
   a. Meakin C, Martin E, **Santos HP Jr**, Mokrova I, Kuban K, O'Shea M, Joseph RM, Smeester L, Fry R. (2018). Placental CpG methylation of HPA-axis genes is associated with cognition at age 10 among children born extremely preterm. *Hormones and Behavior*, 101:29-35. doi: 10.1016/j.yhbeh.2018.02.007. PMCID: PMC6354776.
   b. Bulka CM, Dammann O, **Santos HP Jr,** VanderVeen DK, Smeester L, Fichorova R, O'Shea TM, Fry RC. (2019). Placental CpG methylation of inflammation, angiogenic and neurotrophic genes and retinopathy of prematurity. *Investigative Ophthalmology & Visual Science Journal,* 60(8):2888-2894. doi: 10.1167/iovs.18-26466. PMCID: PMC6607927.
   c. Addo KA, Bulka CM, Dhingra R, **Santos HP Jr,** Smeester L, O'Shea TM, Fry RC. (2019). Acetaminophen use during pregnancy and DNA methylation in the placenta of the extremely low gestational age newborn (ELGAN) cohort. *Environmental Epigenetics,* 5(2):dvz010. doi.org/10.1093/eep/dvz010. PMCID: PMC6682751.
   d. Clark JS, Martin EM, Bulka CM, Smeester L, **Santos HP Jr**, O'Shea TM, Fry RC. (2019). Associations between placental CpG methylation of metastable epialleles and childhood body mass index across ages one, two and ten in the Extremely Low Gestational Age Newborns (ELGAN) cohort. *Epigenetics,* [Epub ahead of print]. doi: 10.1080/15592294.2019.1633865. PMCID: PMC6773381.

3. **The effects of the social environment on the epigenome and related perinatal and child health outcomes**: Complementing and extending my developmental origins of child health origins work, I aim to understand the effects of social hardship (e.g., social adversity) and early life stressors in children's neurodevelopmental outcomes. Currently, I have focused my work and expertise more widely on the effects of maternal hardship, early life stressors and the effects of the epigenome on children outcomes. Taken

together, my work bridges the gap between the social and the biological dimensions of maternal hardship, early life stressors and child neurodevelopment.

a. **Santos HP Jr,** Nephew B, Bhattacharya A, Tan X, Smith L, Alyamani R, Martin E, Perreira K, Fry R, Murgatroyd C. (2018). Discrimination Exposure and DNA methylation of stress regulatory genes in Latina mothers. *Psychoneuroendocrinology*, 98:131-138. doi: 10.1016/j.psyneuen.2018.08.014. PMCID: PMC6204298.
b. Nephew B, Febo M, **Santos HP Jr.** (2018). Neither biological nor symptomatology reductionism: a call for integration in psychopathology research. *Behavioral & Brain Sciences*, 42:e17. doi: 10.1017/S0140525X18001279.; PMCID: N/A..
c. **Santos HP Jr,** Martin E, Mokrova I, Joseph RM, Hooper S, Frazier J, Kuban K, O'Shea M, Fry RC. (2019). Epigenome-wide placental DNA methylation: Associations with socioeconomic factors in mothers of preterm children. *Epigenetics*, 14(8):751-765. doi: 10.1080/15592294.2019.1614743. PMCID: PMC6615526.
d. Pittet F, van Caenegem N, Hicks-Nelson AR, **Santos HP Jr,** Bradburn S, Murgatroyd C, Nephew B. (2019). Maternal social environment affects offspring cognition through behavioural and immune pathways in rats. *Journal of Neuroendocrinology*, e12711 doi: 10.1111/jne.12711. PMCID: In process.

4. **Psychological distress in high-risk populations and its effects on child health**: I have explored maternal perinatal psychological distress as an early life (fetal, neonatal) stressor that can have significant effects on child health and neurodevelopment. I have made substantial contributions to knowledge of underlying symptom structure and biology of psychological distress in high-risk mothers. Furthermore, I have explored longitudinal aspects of maternal depressive and anxiety symptoms, finding that groups of mothers differ in trajectories of postpartum affective symptoms and in their perceptions of infants and parental behavior. These trajectory classes defined during early postpartum could predict maternal behavior (involvement with infant; developmental stimulation) and the quality of the home environment at 2 and 6 months postpartum and infant developmental outcomes at age 1 year. In exploring the underlying symptom structure of postpartum heterogeneity, I was the first to use network analysis to describe the symptom network dynamic of phenotypes, and related stress and reproductive hormones.
   a. Holditch-Davis D, **Santos HP Jr**, Levy J, White-Traut R, David R, O'Shea M, Geraldo V. (2015). Patterns of psychological distress in mothers of preterm infants. *Infant Behavior and Development*, 41:154-63. doi:10.1016/j.infbeh.2015.10.004. PMCID: PMC4654120.
   b. **Santos HP Jr**, Fried EI, Asafu-Adjei J, Ruiz RJ. (2017). Network structure of perinatal depressive symptoms in Latinas: Relationship to stress and reproductive biomarkers. *Research in Nursing & Health*, 40(3):218-228. doi:10.1002/nur.21784. PMCID: PMC5503306.
   c. **Santos HP Jr**, Kossakowski J, Schwartz T, Beeber L, Fried E. (2018). Longitudinal network structure of depression symptoms and self-efficacy in low-income mothers. *Plos One*, 13(1):e0191675. doi: 10.1371/journal.pone.0191675. PMCID: PMC5779701.
   d. Vale PRLFD, Cerqueira S, **Santos HP Jr**, Black BP, Carvalho ESS. (2019). Bad news: Families' experiences and feelings surrounding the diagnosis of Zika-related microcephaly. *Nursing Inquiry*, 26(1):e12274. doi: 10.1111/nin.12274. PMCID: N/A.

5. **Understanding and addressing perinatal health disparities**: Researching high-risk populations for health disparities requires the development of methodologies and scientific evidence to support and advocate for more work in this neglected domain of research. Perinatal mental health problems have been overlooked in at-risk populations, such as pre-term mothers and ethnic minorities. I have made substantial contributions in the field of perinatal mental health disparities over the last eight years.
   a. **Santos HP Jr,** Tan X & Salomon R. (2017). Heterogeneity in perinatal depression: How far have we come? A systematic review. *Archives of Women's Mental Health*, 20(1):11–23. doi: 10.1007/s00737-016-0691-8. PMCID: PMC5507213
   b. Pao C, Guintivano J, **Santos HP Jr**, Meltzer-Brody S. (2019). Postpartum depression and social support in a racially and ethnically diverse population of women. *Archives of Women's Mental Health*, 22(1):104-114. doi: 10.1007/s00737-018-0882-6. PMCID: PMC6800248.
   c. Adynski H, Zimmer C, Thorp J, **Santos HP Jr**. (2019). Predictors of psychological distress in low income mothers. *Research in Nursing & Health*, 42:205-216. doi: 10.1002/nur.21943. PMCID: PMC6472896.

d. Dennis CL, Shiri R, Brown HK, **Santos HP Jr**, Hassani KF. (2019). Breastfeeding rates between immigrant and non-immigrant: Systematic review and meta-analysis. *Maternal and Child Nutrition*, 15(3):e12809. doi: 10.1111/mcn.12809. PMCID: PMC7199026.

Complete List of Published Work in My Bibliography:
https://www.ncbi.nlm.nih.gov/myncbi/16qzewfzowr5v/bibliography/public/

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

1R01NR019245-01 Santos (PI) 09/10/2020 - 07/31/2025
Genetic and Epigenetic Effects on Childhood Cognitive Trajectories
The overall goal of this study is to determine how the genomic predictors of childhood cognitive trajectories among children born extremely premature.
Role: PI

1R03HD101413-01 Santos (PI) 04/08/2020 – 03/31/2022
Placental Origins of Positive Child Health Outcomes
The overall goal of this study is to determine how the placenta genome and epigenome determines the likelihood of children born extremely premature having positive health outcomes later in life.
Role: PI

1K23NR017898-01 Santos (PI) 09/26/2018 – 08/31/2021
Placental DNA Methylation, Maternal Hardship and Child Neurodevelopmental Outcomes
The goal of this study is to establish relationships among DNA methylation, maternal hardship and neurodevelopmental impairment in extremely preterm children.
Role: PI

4UH3OD023348-03 Fry, O'Shea (PI) 09/21/2019 – 08/31/2023
Environment, Epigenetics, Neurodevelopment & Health of Extremely Preterm Children
In this project we are building on the success of the ELGAN Study by adding new information about: 1) environment exposures; 2) neurodevelopmental outcomes of study participants at age 15 and 18 years; and 3) placental epigenetics, a mechanism that could link early life inflammation to neurodevelopment.
Role: Co-I

UNC Senich Innovation Award Santos (PI) 06/01/2018 – 10/30/2020
Gene-Environment Interactions Regulating Social Stressors and Health Distress in Latinas
This research explores gene-environment interactions in the regulation of social stressor exposure in a sample of high-risk Latina mothers and their children.
Role: PI

D19HP30861 Rodgers (PI) 07/01/2017 – 06/30/2021
Health Resources and Services Administration (HRSA)
Nursing Workforce Diversity
This grant provides training support for minority students in the UNC BSN program to increase the nursing workforce diversity
Role: Co-I

T32NR007091 Santacroce, Leeman (MPI) 06/01/2015 – 06/30/2021
Interventions for preventing and managing chronic illness
The grant provides training support for pre- and post-doctoral trainees in descriptive and intervention research that helps prevent and manage chronic illness.
Role: Faculty

Completed Research Support

550KR131619NA (CTSA UL1TR00111) Santos (PI) 07/01/2017 – 06/30/2018
Postpartum Depressive Symptoms in Latinas: Associations with Hormonal and Stressors Function
This study examined the contribution of stress-related and reproductive hormones and social stressors to the development of postpartum depressive symptoms in low-SES Latina mothers.
Role: PI

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Propper, Cathi B.

eRA COMMONS USER NAME (credential, e.g., agency login): propper

POSITION TITLE: Research Scientist

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Connecticut College	B.A.	06/1998	Psychology
Duke University	Ph.D.	06/2006	Developmental Psychology
University of North Carolina at Chapel Hill	Postdoctoral	06/2007	Developmental Psychology

A. Personal Statement

This application is for predoctoral training for Harry Adysnki RN, BSN. I am a strong fit as his co-sponsor and mentor because I have extensive experience and expertise in studying the development of infant and child behavior, cognition, emotion regulation, and sleep both individually and within the parent-child relationship. My research interests, as evidenced by my publication history, focus on development as it is influenced by gene x environment interactions, caregiving behaviors, biobehavioral processes, early experience, and infant temperament over the first years of life. My goal to better understand these associations across levels (physiological, genetic, environmental) and over time, from the prenatal period to early childhood, is driven by my perspective as a developmental scientist. I am the Principal Investigator of multiple grants investigating the pathways between parent-child interactions, infant sleep, and subsequent social-emotional and cognitive development across the first year of life in various samples (e.g, African American families, infants exposed to nicotine during pregnancy, families living in poverty). For each of these studies I measure prenatal stress, life stress, race-related stress, psychological well-being, and executive functioning in mothers as well as conduct comprehensive postnatal observations in the home including in depth sleep observations using actigraphy, heart rate variability, and videosomnography. In addition to my current grants, as the Director of the Durham Child Health and Development Study (DCHD Study) for 12 years, I gained a significant amount of experience developing and carrying out protocols for data collection from children aged 3 months to 11 years, beginning with recruitment followed by visits in the home and the lab. I have wide-ranging experience recruiting participants, collecting data, and managing large datasets as well as measuring, coding, and analyzing mother and infant behavior and physiology within parent-child interactions during the day and through the night. I am currently the PI of an NICHD R01 that examines links between early adversity (poverty) and child brain, cognitive, social-emotional, and health outcomes (5R01HD091148-03). As the director of the DCHD Study I will assist Mr. Adynski's training by providing data access and guided mentorship to facilitate his proposed secondary analysis. Given my background, I am ideally suited to serve in the co-sponsor role for this proposal. I am committed to Mr. Adynski's training and will meet with him biweekly to support his training and development.

1. **Propper C,** Willoughby M, Halpern CT, Carbone MA, Cox M. Parenting quality, DRD4, and the prediction of externalizing and internalizing behaviors in early childhood. *Developmental Psychobiology*. 2007 Sep;49(6):619-32. doi: 10.1002/dev.20249. PMCID: N/A.
2. **Propper C**, Moore GA, Mills-Koonce WR, Halpern CT, Hill-Soderlund AL, Calkins SD, Carbone MA, Cox M. Gene-environment contributions to the development of infant vagal reactivity: the interaction of dopamine and maternal sensitivity. *Child Development*. 2008 Sep-Oct;79(5):1377-94. doi: 10.1111/j.1467-8624.2008.01194.x. PMCID: N/A.

3. **Propper, C. B.,** Moore, G., & Mills-Koonce, W. R. (2010). Gene-parenting interplay in the development of infant emotionality. In K.E. Hood, C. T. Halpern, G. Greenberg, and R.M. Learner (Eds.), *The handbook of developmental science, behavior and genetics* (pp. 529-556). Oxford: Blackwell Publishing. PMCID: N/A.
4. **Propper, C.B**. (2012). The early development of vagal tone: Effects of poverty and elevated contextual risk. In V. Maholmes & R. B. King (Eds.), *Oxford library of psychology. The Oxford handbook of poverty and child development* (p. 103–123). Oxford University Press. PMCID: N/A.

B. Positions and Honors

Positions and Employment

2002	Graduate Teaching Assistant, Department of Psychology, Duke University, Durham, NC
2002-2005	Graduate Research Assistant, The Durham Child Health and Development Study, University of North Carolina at Chapel, Chapel Hill, NC
2004-2005	Graduate Instructor, Department of Psychology, Duke University, Durham, NC
2005-2006	Adjunct Professor, Department of Psychology, Elon University, Elon, NC
2006-2007	Postdoctoral Research Associate, Center for Developmental Science, University of North Carolina at Chapel Hill, Chapel Hill, NC
2007-	Research Scientist/Project Director, Center for Developmental Science, University of North Carolina at Chapel Hill, Chapel Hill, NC
2010-2016	Adjunct Assistant Professor, Department of Psychology, University of North Carolina at Chapel Hill, Chapel Hill, NC
2017-	Adjunct Associate Professor, Department of Psychology, University of North Carolina at Chapel Hill, Chapel Hill, NC
2014-2017	Assistant Director for Training and Research, Center for Developmental Science, University of North Carolina at Chapel Hill, Chapel Hill, NC
2017-	Associate Director for Training and Research, Center for Developmental Science, University of North Carolina at Chapel Hill, Chapel Hill, NC
2018-2019	Interim Director, Center for Developmental Science,University of North Carolina at Chapel Hill, Chapel Hill, NC
2019-	Advanced Research Scientist, Frank Porter Graham Child Development Institute, University of North Carolina at Chapel Hill, Chapel Hill, NC

Other Experience and Professional Memberships

1998-	Member, Phi Beta Kappa
1998-	Member, Psi Chi
2000-	Member, Association for Psychological Science
2005-	Member, Society for Research in Child Development
2009-	Member, International Society for Developmental Psychobiology

Honors

1998	Magna Cum Laude
2004-2005	Preparing Future Faculty Fellowship
2005-2006	Predoctoral Fellow, Center for Developmental Science
2011-2012	NcTracs Award, National Center for Advancing Translational Science, UNC-CH
2011-2013	University Research Council Award, UNC-Chapel Hill
2016-2017	NcTracs Award (50k), National Center for Advancing Translational Science, UNC-CH
2019-2020	NcTracs Award (50k), National Center for Advancing Translational Science, UNC-CH

C. Contribution to Science

1. My primary research interest is in the development of infant emotion regulation and behavior over across the first 5 years. Child characteristics are crucial to these developing processes, and I have focused my research on better understanding the way in which the autonomic nervous system, in particular, supports behavioral regulation. I have authored or co-authored multiple empirical papers and chapters that provide evidence of the association between the parasympathetic branch of the autonomic nervous system and child self-regulatory

capacities, as well as the ways in which this physiological system may be influenced by the environment, and predict cognitive and emotional outcomes (specifically via parenting behavior, parent-child relations, and broader context of risk).

a. **Propper, C. B.,** & Holochwost, S. J. (2013). The influence of proximal risk on the early development of the autonomic nervous system. *Developmental Review*, *33*, 151-167. PMCID: N/A.
b. Gueron-Sela, N., Wagner, N.J., **Propper, C.B**., Mills-Koonce, W.R., Moore, G.A., & Cox, M.J. (2017). The interaction between child respiratory sinus arrhythmia and early sensitive parenting in the prediction of children's executive functions. *Infancy, 22,* 171-189. PMCID: N/A.
c. Gueron-Sela, N., **Propper, C.B.**, Wagner, N., & Bedford, R. (2017). Children's executive functions attenuate the link between maternal intrusiveness and internalizing behaviors at school entry. *The Journal of Clinical Child and Adolescent Psychology,* 1-10. PMCID: PMC6669043.
d. Holochwost SJ, Volpe VV, Gueron-Sela N, Propper CB, Mills-Koonce WR. Sociodemographic risk, parenting, and inhibitory control in early childhood: the role of respiratory sinus arrhythmia. *Journal of Child Psychology and Psychiatry.* 2018 Sep;59(9):973-981. doi: 10.1111/jcpp.12889. Epub 2018 Mar 13. PMCID: PMC7359026.

2. In addition to intrinsic characteristics of the child, the environment plays a large role in the development of critical behavioral, social-emotional, and cognitive outcomes. The most salient aspect of the infant's world is their caregivers. Thus, the way in which parenting style (i.e., sensitive responsiveness, negativity) shapes child development is a major question in the field, as well as the influence of early experiences that are shaped by caregivers (i.e., sleep, nutrition, physical activity). I am particularly interested in the ways in which family functioning, parent health and well-being, and caregiving behavior influences development of infant and child sleep. I have several findings that indicate that parenting may directly influence the development of infant emotion regulation skills but may also moderate the relation between child physiology/genetics and social-emotional outcomes.

a. **Propper, C.,** & Moore, G.A. (2006). The influence of parenting on infant emotionality: A multi-level psychobiological perspective. *Developmental Review, 26*, 427-460. PMCID: N/A.
b. Calkins, S. D., **Propper, C.B**., & Mills-Koonce, W. R. (2013). A biopsychosocial perspective on parenting and developmental psychopathology. *Development and psychopathology*, *25*, 1399-1414. PMCID: N/A.
c. Wagner, N., Bedford, R., & Gueron-Sela, N., & **Propper, C**. (2018). Maternal attributions of infant behavior and parenting in toddlerhood predict teacher-rated internalizing problems in childhood. *Journal of Clinical Child and Adolescent Psychology, 47,* 569-577. PMCID: PMC6669045.
d. Gueron-Sela, N., **Propper, C.B**., Wagner, N., Camerota, M., Tully, K., & Moore, G. (2017). Infant respiratory sinus arrhythmia and maternal depressive symptoms predict toddler sleep problems. *Developmental Psychobiology, 59*, 261-267. PMCID: N/A.

3. More recently, I have extended my work in two ways via collaborations with investigators across various disciplines (i.e., Nursing, Ob-Gyn, Psychiatry, Sociology, Education). First, I have applied the knowledge I gained from studying these processes within a community sample to higher risk populations. We have examined how these processes develop in infants who are part of more complex dyads, such as mothers with postpartum depression and eating disorders, or from families at higher risk for ADHD. And second, I have extended my work with young children into the preschool and elementary school classrooms to better understand the long term effects of early child-parent relationships.

a. Holochwost, S. J., Gariépy, J.-L., **Propper, C. B.,** Gardner-Neblett, N., Volpe, V., Neblett, E., & Mills-Koonce, W. R. (2016). Sociodemographic risk, parenting, and executive functions in early childhood: The role of ethnicity. *Early Childhood Research Quarterly, 36,* 537–549. https://doi.org/10.1016/j.ecresq.2016.02.001. PMCID: N/A.
b. Stuebe, A., Grewen, K., Pedersen, C.A., **Propper, C.B**., & Meltzer-Brody, S. (2012). Failed lactation and perinatal depression: Common problems with shared neuroendocrine mechanisms? *Journal of Women's Health*, 21, 264-272. PMCID: PMC3298672

c. Sullivan, E.L., Holton, K.F., Nousen, E.K., Barling, A.N., Sullivan, C.A., **Propper, C.B.,** & Nigg, J.T. (2015). Early identification of ADHD risk via infant temperament and emotion regulation: A pilot study. *Journal of Child Psychology and Psychiatry.* PMCID: N/A.
d. **Propper, C.B.,** Shanahan, M.J., Russo, R., & Mills-Koonce, W.R. (2012). Evocative gene-parenting correlations and academic performance at first grade: An exploratory study. *Development and Psychopathology, 24,* 1265-1282. PMCID: N/A.

Complete List of Published Work in MyBibliography

http://www.ncbi.nlm.nih.gov/sites/myncbi/1D70i2OUcvlAS/bibliography/47996680/public/?sort=date&direction=ascending

D. Research Support

Ongoing Research Support

R01HD091148 Propper and Short (Co-PIs) 12/01/2017-11/30/2022
A mechanistic study of the association between poverty and executive functions in early childhood: Contributions of early brain development and the early caregiving environment
This study proposes to examine the link between poverty and executive functions during the first years of life. Early neurological development will be examined as a mediator of this association examined from pregnancy to age 3. In addition, we investigate critical experiences within the proximal context (i.e., language exposure, caregiver behavior, child sleep hygiene) that may mediate the effect on child structural and functional brain development. Role: Principal Investigator

R01DA038215 Grewen (PI) 07/01/16 – 04/30/21
Cocaine and Maternal Behavior: Effects on Trajectory of Infant Brain Development
This study examines prenatal cocaine exposure on developmental trajectories of infant brain structure and the extent to which the effect on early cognitive functions are predicted by gray and white matter, as well as the moderating effects of maternal behavior on brain development. Role: Investigator

1R43HD097017 Hagler and Tully (Co-PIs) 09/01/18-08/31/20
Development of the couplet care bassinet to support safe implementation of skin-to-skin contact and rooming-in on postnatal units Role: Investigator
This project will develop the Couplet Care Bassinet™ to address the long standing shortcomings of existing hospital infant bassinets of offer new safety features.

Completed Research Support

K01DA035298 Propper (PI) 03/15/2014-02/28/2019
Prenatal Cigarette Exposure: The Role of Sleep and Regulation for Infant Outcomes
This study aims to examine pathways between prenatal exposure to cigarettes and infant social-emotional and cognitive outcomes at 9 months of age, with a focus on the mediating role of infant sleep.
Role: Principal Investigator

R01HD073220 Steube (PI) 04/01/2013-03/31/2018
Mood, Mother and Infant: The Psychobiology of Impaired Dyadic Development
This study aims to define the neuroendocrine mechanisms underlying postpartum depression and impaired dyadic development, indexed by failed lactation, reduced maternal sensitivity, and impaired infant emotional regulation. We aim to identify targets for prevention and treatment of perinatal depression and impaired dyadic development. Role: Investigator

Foundations of Hope Grewen (PI) 05/01/2015-04/30/2018
Oxytocin Effects on Cocaine-Induced Maternal Neglect

This study offers a promising new treatment which targets the negative effects that cocaine use during pregnancy has on mothering behavior. We will develop oxytocin as a viable intervention in cocaine-induced maternal neglect. Role: Investigator

R21HD082707 Hodges (PI) 04/01/2016-03/31/2018
Enhancing Caregiver-Infant Communication to Prevent Obesity
In addition to a variety of self-report and anthropometric measures, this study will use integrated behavioral (video) and physiologic (RSA) measures to better understand feeding dynamics and their relationship with obesity risk to help reduce the prevalence of early childhood obesity and its extension into later childhood.
Role: Investigator

R21MH10433 Santelli (PI) 07/01/2014-06/30/2016
Gut Microbiota and Anxiety: A Mechanistic Study Of Human Infants
The objective of this application is to determine how microbial colonization impacts anxious behavior at 1 year of age and to identify signaling mechanisms and neural circuits mediating this relationship using high resolution magnetic resonance imaging (MRI), diffusion tensor imaging (DTI) and resting state fMRI (rfcMRI).
Role: Investigator

R21HD077146 Propper (PI) 04/01/2014-03/31/2017
Infant Sleep Development: Contributions of Infant Vagal Tone and Parenting
This study aims to examine the interplay between caregiving and infant vagal tone (a purported physiological index of self-regulation) in prediction of developing infant sleep patterns over the first six months of life.
Role: Principal Investigator

R21HD075309 Propper & Coffman (co-PIs) 06/01/2012-05/31/2016
Self-Regulation in Preschool: The Role of Child Physiology, Parents, and Teachers
The purpose of this study is to carry out a short-term longitudinal examination of the early underlying processes of emotion regulation and executive functioning relate to later self-regulation in the classroom. We explore the interplay between the child's own physiological and behavioral self-regulatory capacities, the early caregiving environment, and experiences in the Pre-K classroom across 3 to 4 years of age and the independent and joint influences of each of these levels on academic achievement at the end of Pre-K.
Role: Principal Investigator

R03HD055402 Propper (PI) 08/15/2008 – 07/31/2011
Intrinsic and Extrinsic Effects on Trajectories of Infants' Vagal Functioning
This study aimed to examine cardiac vagal tone for infants at baseline and during challenge tasks at 3, 6, 12, 18, 24, 30, and 36 months of age in the Durham Child Health and Development Study. Intrinsic and extrinsic factors were examined as predictors and outcomes of trajectories.
Role: Principal Investigator

BCS-0720660 Cox (PI) 08/01/2007-07/31/2013
Integrated Research Activities for Developmental Science (IRADS): Child Development Research Collaborative
This project builds upon the success of establishing the Durham Child Health and Development Study that was initially funded by NSF in 2001. The study will continue to follow the cohort another five years in order to address critical questions concerning the ways in which the transition to early formal schooling confers advantage on some children and disadvantage on others.
Role: Investigator

BCS-1023977 Halberstadt (PI) 7/01/2010–6/30/2013
Collaborative Research: A dynamic multidimensional examination of parental socialization of children's emotion understanding and social competence in middle childhood
This study explores relations between the multiple components of emotion understanding and examines direct and mediated contributions to children's emotion understanding made by mothers' parenting styles, beliefs about emotions, and emotion socialization behaviors.
Role: Investigator

OMB No. 0925-0001 and 0925-0002 (Rev. 03/2020 Approved Through 02/28/2023)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.

Follow this format for each person. DO NOT EXCEED FIVE PAGES.

NAME: Gilmore, John H.

eRA COMMONS USER NAME (agency login): JGILMORE

POSITION TITLE: Thad and Alice Eure Distinguished Professor of Psychiatry

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of Virginia, Charlottesville, VA	BA	05/1981	Political and Social Thought
University of North Carolina, Chapel Hill, NC	MD	05/1985	Medicine
The Graduate Hospital, Philadelphia, PA	Other training	06/1986	Intern, Department of Surgery
University of North Carolina, Chapel Hill, NC	Resident	06/1987	Department of Neurology
New York Hospital-Cornell Medical Center, New York, NY	Resident	06/1989	Department of Psychiatry

A. Personal Statement

This application is for the predoctoral training for Harry Adysnki RN, BSN. His overall research interest is in exploring the role of social adversity on early child development, health, and well-being among vulnerable populations. I am well suited to serve as a mentor based on my own experience and expertise in early child development and longitudinal developmental trajectories. My research focuses on understanding how early childhood brain development contributes to risk for schizophrenia and other psychiatric disorders. I use structural and functional imaging to study early childhood developmental trajectories and their relationship to cognitive and behavioral development in typically developing children, in twins, and in children at high risk for psychiatric disorders. I oversee the UNC Early Brain Development Study, a large, longitudinal study of early childhood brain development that encompasses structural, diffusion tensor and resting state functional MRI, that also studies environmental and genetic contributions to early brain development. Mr. Adynski will have access to the ongoing work in the Early Brain Development Study throughout his training and has been integrated into my research team meetings. I will also provide mentorship throughout Mr. Adynski's training and provide opportunities for him to collaborate within my research group to develop scholarly activities in our ongoing work.

1. Lyall AE, Shi F, Geng X, Woolson S, Li G, Wang L, Hamer RM, Shen D, **Gilmore JH**. Dynamic development of regional cortical thickness and surface area in early childhood. *Cerebral Cortex*. 2015; 25: 2204-12. PMCID: PMC4506327.
2. Gao W, Alcauter S, Smith JK, **Gilmore JH**, Lin W. Development of human brain cortical network architecture during infancy. *Brain Structure and Function*. 2015; 220 (2):1173-86. PMCID: PMC4850360.
3. **Gilmore JH**, Knickmeyer RC, Gao W. Imaging structural and functional brain development in early childhood. *Nature Review Neuroscience*. 2018; 19: 123-137. PMCID:PMC5987539.
4. Girault JB, Munsell BC, Puechmaille D, Goldman BD, Prieto JC, Styner M, **Gilmore JH**. White matter connectomes at birth accurately predict cognitive abilities at age 2 years. *NeuroImage*. 2019; 192:145-155. PMID: 30825656.

B. Positions and Honors

Positions and Employment

1990 - 1991 Clinical Instructor, Department of Psychiatry, UNC-CH

1991 - 1997	Assistant Professor, Department of Psychiatry, UNC-CH
1992 -	Research Scientist, UNC Neuroscience Center, UNC-CH
1994 -	Faculty, Curriculum in Neurobiology, UNC-CH
1997 - 2002	Associate Professor with tenure, Department of Psychiatry, UNC-CH
2002 -	Professor, Department of Psychiatry, UNC-CH
2005 - 2006	Acting Associate Chair for Research, Department of Psychiatry, UNC-CH
2007 -	Vice Chair for Research and Scientific Affairs, Department of Psychiatry, UNC-CH
2008 -	Thad and Alice Eure Distinguished Professor of Psychiatry, UNC-CH

Other Experience and Professional Memberships

1993 -	Member, Society for Neuroscience
1995 -	Member, Society for Biological Psychiatry
2003 -	Member, American Psychiatric Association
2004 -	Member, American College of Neuropsychopharmacology
2005 - 2012	Director, UNC Conte Center for the Neuroscience of Mental Disorders
2006 - 2010	Member, Developmental Brain Disorders Study Section
2009 -	Director, UNC Center for Excellence in Community Mental Health

Honors

1981	Phi Beta Kappa, University of Virginia
1981	Graduate with High Distinction, University of Virginia
1984	Medical Student Research Fellowship, Epilepsy Foundation of America
1992	IBM Junior Faculty Development Award, University of North Carolina School of Medicine
1993	Travel Award, American College of Neuropsychopharmacology
1995	Young Investigator Award, Southern Association for Research in Psychiatry
1996	Jefferson-Pilot Fellowship Award, University of North Carolina School of Medicine
1997	Distinguished Professional Service Award, Mental Health Association of Orange County, NC
2004	Eugene A. Hargrove Mental Health Research Award, North Carolina Psychiatric Association
2006	Alpha Omega Alpha Medical Honor Society, UNC-CH
2012	President's Award, North Carolina Psychiatric Association

C. Contribution to Science

1. Imaging studies of early childhood brain development: Many developmental and psychiatric disorders have origins in early childhood brain development. My research has pioneered image acquisition and image analysis for the study of early postnatal brain development and has provided fundamental discoveries about the dynamic and rapid development of gray and white matter, and resting state networks in early childhood and their relationship to cognitive development.

    a. Knickmeyer RC, Gouttard S, Kang C, Evans D, Wilber K, Smith JK, Hamer RM, Lin W, Gerig G, **Gilmore JH**. A structural MRI study of human brain development from birth to 2 years. *Journal of Neuroscience*. 2008 Nov 19;28(47):12176-82. PMCID: PMC2884385.

    b. Gao W, Zhu H, Giovanello KS, Smith JK, Shen D, **Gilmore JH**, Lin W. Evidence on the emergence of the brain's default network from 2-week-old to 2-year-old healthy pediatric subjects. *Proceedings of the National Academy of Sciences of the United States of America*. 2009 Apr 21;106(16):6790-5. PMCID: PMC2672537.

    c. Lee SJ, Steiner RJ, Yu Y, Short SJ, Neale MC, Styner M, Zhu H, **Gilmore JH**. Common and heritable components of white matter microstructure predict cognitive function at 1 and 2 years. *Proceedings of the National Academy of Sciences of the United States of America*. 2017; 114(1):148-153. PMCID: PMC5224366.

d. Girault JB, Munsell BC, Puechmaille D, Goldman BD, Prieto JC, Styner M, **Gilmore JH**. White matter connectomes at birth accurately predict cognitive abilities at age 2. *NeuroImage*. 2019, 192:145-155. PMCID: PMC6453706.

2. Early Brain Development in High Risk Children: Understanding how early brain development occurs in children at high risk will ultimately allow early identification and intervention to correct abnormal developmental trajectories, reduce risk and improve outcomes. I have developed longitudinal cohorts of children at high risk for neurodevelopmental and psychiatric disorders, including schizophrenia, bipolar illness, and depression, as well as a cohort of children with fetal mild ventricluomegaly. Studies to date have documented that early brain structure and function is abnormal in these high risk groups, and that genes of risk alter neonatal brain structure, indicating that early identification and intervention strategies need to be focused on early childhood.

   a. **Gilmore JH**, Smith LC, Wolfe HM, Hertzberg BS, Smith JK, Chescheir NC, Evans DD, Kang C, Hamer RM, Lin W, Gerig G. Prenatal mild ventriculomegaly predicts abnormal development of the neonatal brain. *Biological Psychiatry*. 2008 Dec 15;64(12):1069-76. PMCID: PMC2630424.
   b. **Gilmore JH**, Kang C, Evans DD, Wolfe HM, Smith JK, Lieberman JA, Lin W, Hamer RM, Styner M, Gerig G. Prenatal and neonatal brain structure and white matter maturation in children at high risk for schizophrenia. *American Journal of Psychiatry*. 2010 Sep;167(9):1083-91. PMCID: PMC3105376.
   c. Knickmeyer RC, Wang J, Zhu H, Geng X, Woolson S, Hamer RM, Konneker T, Lin W, Styner M, **Gilmore JH**. Common variants in psychiatric risk genes predict brain structure at birth. *Cerebral Cortex*. 2014; 24:1230-46. PMCID: PMC3977618.
   d. Ahn SJ, Cornea E, Murphy V, Styner M, Jarskog LF, **Gilmore JH**. White matter development in infants at risk for schizophrenia. *Schizophrenia Research*. 2019; 210:107-114. PMCID: PMC6689450.

3. Twin Studies of Early Childhood Brain Development: Twin studies in older children and adults indicate that brain structure and function are highly heritable. Nothing was known about how genetic and environmental factors contribute to the earliest and most dynamic period of human brain development. Studies in our twin cohort have identified heterogeneous genetic influences on developing white and gray matter as well as functional networks that provide high heritability targets for imaging genetic studies.

   a. **Gilmore JH,** Schmitt JE, Knickmeyer RC, Smith JK, Lin W, Styner M, Gerig G, Neale MC. Genetic and environmental contributions to neonatal brain structure: A twin study. *Human Brain Mapping*. 2010 Aug;31(8):1174-82. PMCID: PMC3109622.
   b. Gao W, Elton A, Zhu H, Alcauter S, Smith JK, **Gilmore JH**, Lin W. Intersubject variability of and genetic effects on the brain's functional connectivity during infancy. *Journal of Neuroscience*. 2014; 34:11288-96. PMCID: PMC4138339.
   c. Lee SJ, Steiner RJ, Luo S, Neale MC, Styner M, Zhu H, **Gilmore JH**. Quantitative tract-based white matter heritability in twin neonates. *Neuroimage*. 2015; 111: 123-35. PMCID: PMC4387008.
   d. Jha S, Xia K, Schmitt JE, Ahn M, Girault JB, Murphy VA, Li G, Wang L, Shen D, Zou F, Zhu H, Styner M, Knickmeyer RC, **Gilmore JH**. Genetic influences on neonatal cortical thickness and surface area. *Human Brain Mapping*. 2018; 39:4998-5013. PMCID: PMC6218288.

4. Infection and Schizophrenia: Prenatal exposure to infection is a risk factor for schizophrenia and other neurodevelopment disorders. My early research career focused how inflammatory cytokines regulate neuronal maturation and apoptosis, mechanisms through which exposure to infection could alter brain development and increase risk for schizophrenia.

   a. Urakubo A, Jarskog LF, Lieberman JA, **Gilmore JH**. Prenatal exposure to maternal infection alters cytokine expression in the placenta, amniotic fluid, and fetal brain. *Schizophrenia Research*. 2001 Jan 15;47(1):27-36. PMID: 11163542.
   b. Jarskog LF, Selinger ES, Lieberman JA, **Gilmore JH**. Apoptotic proteins in the temporal cortex in schizophrenia: high Bax/Bcl-2 ratio without caspase-3 activation. *American Journal of Psychiatry*. 2004 Jan;161(1):109-15. PMID: 14702258.

c. **Gilmore JH**, Fredrik Jarskog L, Vadlamudi S, Lauder JM. Prenatal infection and risk for schizophrenia: IL-1beta, IL-6, and TNFalpha inhibit cortical neuron dendrite development. *Neuropsychopharmacology*. 2004 Jul;29(7):1221-9. PMID: 15085088.

d. Short SJ, Lubach GR, Karasin AI, Olsen CW, Styner M, Knickmeyer RC, **Gilmore JH**, Coe CL. Maternal influenza infection during pregnancy impacts postnatal brain development in the rhesus monkey. *Biological Psychiatry*. 2010 May 15;67(10):965-73. PMCID: PMC3235476.

Complete List of Published Work in My Bibliography:
https://www.ncbi.nlm.nih.gov/myncbi/john.gilmore.1/bibliography/public/

D. Research Support

Ongoing Research Support

R01MH111944 (Gilmore, PI) 07/01/17-06/30/22
The Origins of Preadolescent Risk for Psychiatric Disorders in Early Childhood Brain Development
Knowledge gained in this study will improve our basic understanding of human brain development in childhood, allow us to delineate early childhood predictors of risk phenotypes in late childhood, and ultimately help target periods of childhood development for early intervention. Longitudinal follow-up of UNC Early Brain Development Study children at 8 and 10 years of age. Role: PI

NIH/ U Denver, R01HD090068 (Kim, PI) 02/01/17-01/31/22
Prenatal Pathways for How Poverty Influences Brains of Two Generations
We will provide Dr. Kim and her team with continued access to our newest tools, and adaptations of those tools to work optimally with data of Diffusion Tensor Imaging (DTI) and structural MRI associated with the project. Role: Investigator

R01HD091148 (Short/Propper, PI) 02/10/18-12/31/22
A mechanistic study of the association between poverty and executive functions in early childhood: Contributions of early brain development and the early caregiving environment
This study will be the first to investigate the influence of poverty on emerging executive functioning at age 3 via effects on child neurological development over the first two years of life. Role: Investigator

R01MH116225 (Li, PI) 07/11/18-04/30/23
Parcellating Infant Cerebral Cortex based on Developmental Patterns of Multimodal MRI
This project is focused on creating and disseminating novel computational tools for both population-level and individualized infant cortical parcellation utilizing developmental patterns of complementary multimodal cortical properties, and applying them to better understanding inter-individual variability and mapping early brain development. Role: Investigator

NIH/Yale, R01MH116527 (Zhang, PI) 06/01/18-02/28/23
Analysis of Big Data Squared in Biomedical Studies
This project aims at developing statistical methods for integrating big data squared with applications in connectome genetics and genomics. Advanced methods will be verified by using real data sets in order to better address important public health problems. We expect the accomplishments from this project to have significant impact in the understanding of major neuropsychiatric disorders and major neurodegenerative diseases. Role: Investigator

Completed Research Support

NIMH, U01MH070890 (Gilmore, PI) 07/13/04-06/30/20
Early Brain Development in Twins
Role: PI

NIMH, T32 MH106440 (Gilmore, MPI) 07/01/15-06/30/20
Biostatistics and Mental Health Neuroimaging and Genomics Training Grant
Role: MPI

NIH, U01MH110274 (Gilmore, MPI) 09/01/16-05/31/20
UNC/UMN Baby Connectome Project
Role: MPI

NICHD, R01HD053000 (Gilmore, PI) 04/01/06-12/31/19
Early Brain Development in One and Two Year Olds
Role: PI

NIH/UC Irvine, R01MH105538 (Wadhwa, PI). 02/01/16-05/31/20
Intergenerational Effects of Maternal Childhood Trauma on the Fetal Brain
Role: Investigator

NIH/Kitware, Inc., R01EB021391 (Styner, PI) 12/21/16-06/30/20
Shape Analysis Toolbox for Medical Image Computing Projects
Role: PI of subcontract

NIH, R01MH100217, Shen (PI) 08/26/13-05/31/18,
Infant Brain Measurement and Super-Resolution Atlas Construction.
Role: Investigator

NIMH, P50 MH100031, Davidson (PI) 09/01/13-08/31/18,
Early Neurodevelopmental Origins of Anxiety.
Role: Co-Investigator

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. ***DO NOT EXCEED FIVE PAGES.***

NAME: Beeber, Linda

eRA COMMONS USER NAME (credential, e.g., agency login): Linda_Beeber

POSITION TITLE: Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Virginia Commonwealth University	BS	05/1968	Nursing
New York University, New York, NY	MA	05/1970	Mental Health Nursing
University of Rochester, Rochester, NY	PhD	05/1988	Nursing
University of Pennsylvania, Philadelphia, PA	Postdoctoral Fellowship	09/1998	Nursing/Psychosocial Oncology

A. Personal Statement

I bring research expertise and mentoring experience to the predoctoral fellowship training application of Harry Adynski, RN, BSN. Over the last three decades, I have studied how social adversity affects mothers, infants and toddlers, designed interventions that reduced the negative impact of stressors and enhanced dyadic interactions to prevent the negative consequences for the child. Mr. Adynski's proposal will make a significant step toward identification of modifiable factors that mediate the relationship between adversity and dysregulated emotions and behaviors in early childhood. By clarifying the association of adversity, child emotional regulation and school performance, and the mediating effect of maternal executive function and parenting sensitivity on child emotional regulation, Mr. Adynski will establish essential pathways toward interventions to change these drivers. I have experience in constructing theory-driven interventions and embedding them in trusted community-serving entities that reach high-risk mothers and families. I will provide mentorship and direct instruction on intervention design, testing and bringing to scale as well as data analysis and interpretation expertise. My current work is a hybrid RCT/implementation study within a large, national high-risk mother child prevention program. Mr. Adynski will have access to the ongoing work in that study as we test and refine an intervention designed to mitigate the impact of hardship and chronic stressors on mothering behaviors. I will also provide opportunities for Mr. Adynski to collaborate on the scholarly dissemination activities in our current work.

1. **Beeber, L. S**., Perreira, K. M., & Schwartz, T. (2008). Supporting the mental health of mothers raising children in poverty - How do we target them for intervention studies? In *Reducing the Impact of Poverty on Health and Human Development: Scientific Approaches* (Vol. 1136, pp. 86-100). Oxford: Blackwell Publishing. PMCID: PMC4335774.
2. **Beeber, L. S.**, Schwartz, T., Martinez, M., Holditch-Davis, D., Bledsoe, S. E., Canuso, R., & Lewis, V. (2014). Depressive symptoms and compromised parenting in low-income mothers of infants and toddlers: Distal and proximal risks. *Research in Nursing & Health, 37,* 276–291. doi: 10.1002 PMCID: PMC6657018.
3. **Beeber, L. S.,** Holditch-Davis, D., Perreira, K., Schwartz, T., Lewis, V., Blanchard, H., Canuso, R., & Goldman, B. (2010). Short-term, in-home intervention reduces depressive symptoms in Early Head Start Latina mothers of infants and toddlers. *Research in Nursing & Health*, 33(1), 60-76. PMCID: PMC4096768.

Positions and Employment

1970 - 1971	Psychiatric-Mental Health Clinical Nurse Specialist, University Hospitals, Virginia Commonwealth University, Richmond, VA
1971 - 1973	Clinical Nursing Supervisor / Psychiatric Mental Health Clinical Nurse Specialist, Sibley Memorial Hospital, Washington, DC
1974 - 1980	Assistant Director of Nursing / Psychiatric Mental Health Clinical Nurse Specialist, State University of New York Health Science Center, Syracuse, NY
1977 - 1980	Clinical Faculty, State University of New York Health Science Center, Dept. of Psychiatry, Syracuse, NY
1980 - 1999	Instructor (80-82); Assistant Professor (82-88); Associate Professor (88-94); Professor (94-99), College of Nursing, Syracuse University, Syracuse, NY
1993	Faculty Fellow, National Institutes of Mental Health, Bethesda, MD
1999 – 2009	Professor, School of Nursing, UNC-Chapel Hill, Chapel Hill, NC
2009-	Francis Hill Fox Distinguished Term Chair, School of Nursing, UNC-Chapel Hill
2013-	CTSA (NC TraCS) Research Navigator
2017-	Associate Dean, PhD Programs and Division School of Nursing, UNC-Chapel Hill

Other Experience and Professional Memberships

1974 -	American Nurses Association
1988 - 1994	ANA Council of Nurse Researchers
1988 -	Eastern Nursing Research Society; Southern Nursing Research Society
1999 -	American Psychiatric Nurses Association; President 2017-2018

Honors

2003	American Psychiatric Nurses Association Excellence in Research Award
2004	Emerging Star in Health Disparities Award, Howard University
2018	American Academy of Nursing Edgerunner
2020	American Psychiatric Nurses Association Psychiatric Nurse of the Year

B. Contribution to Science

1. **Maternal depressive symptoms matter to very young, high-risk children.** During the infant or toddler era of rapid brain growth, successful neurocognitive, psychomotor and social-emotional development depends on consistent provision of child-centered conversation, developmentally supportive play and assistance with emotional regulation and aggressive behaviors. Especially for a child surrounded by poverty, impoverished neighborhoods and discrimination, mild to moderately severe maternal depressive symptoms can compromise essential mothering behaviors and lead to infant-toddler developmental and language delays, cognitive deficits and later school failure. My collaborators and I were among the first to document that mild to severe maternal depressive symptoms could negatively impact the neurocognitive development in high-risk infants and toddlers. By drawing importance to maternal depression during the entire child developmental era from fetus to three years of age, our work accelerated large-scale efforts to screen for and reduce depressive symptoms during pregnancy and far beyond the postpartum era. We identified how context-specific stressors were linked to maternal depressive symptoms in unserved high-risk populations (low-income mothers and newly immigrated mothers of Mexican descent) and produced empirical studies that linked symptom control, problem-focused strategies and improved parenting to self-efficacy, a mediator of the stress-depression pathway.
    a. **Beeber, L. S**., Perreira, K. M., & Schwartz, T. (2008). Supporting the mental health of mothers raising children in poverty - How do we target them for intervention studies? In *Reducing the Impact of Poverty on Health and Human Development: Scientific Approaches* (Vol. 1136, pp. 86-100). Oxford: Blackwell Publishing. PMCID: PMC4335774.
    b. **Beeber, L. S.**, Schwartz, T., Martinez, M., Holditch-Davis, D., Bledsoe, S. E., Canuso, R., & Lewis, V. (2014). Depressive symptoms and compromised parenting in low-income mothers of infants and toddlers: Distal and proximal risks. *Research in Nursing & Health, 37,* 276–291. doi: 10.1002 PMCID: PMC6657018.
    c. Yang, J., Martinez, M., Schwartz, T., & **Beeber, L. S.** (2017). What is Being Measured? A Comparison of Two Depressive Symptom Severity Instruments to a Depression Diagnosis in

Diverse Low-income, High-risk Mothers. *Journal of Women's Health, 26,* 683-691. doi: 10.1089/jwh.2016.5974. PMCID: PMC5512324.

d. Santos, H. P., Kossakowski, J. J., Schwartz, T. A., **Beeber, L. S.**, & Fried, E. I. (2018). Longitudinal network structure of depression symptoms and self-efficacy in low-income mothers. *PLoS One, 23,* e0191675. doi: 10.1371/journal.pone.0191675. PMCID: PMC5779701.

2. **By "flying under the radar," state of the art, evidence-based treatments for depression and compromised parenting can be delivered to stigma-wary, high-risk underserved mothers.** Prior to our work, interventions either treated postpartum depression or offered parenting guidance to increase depressed mothers' responsiveness to their children. My team and I were the first to combine an evidence-based treatment for depression (Interpersonal Psychotherapy -- IPT) and personalized depressive symptom-focused parenting guidance into an in-home intervention package tailored to embrace ethnic and cultural practices and variations in literacy and language proficiency. We integrated the intervention into trusted, child-focused enrichment entities such as Early Head Start to bypass instrumental barriers of cost, transportation and safety and reduce stigma. The intervention reduced depressive symptoms below clinical threshold in less than 3 months, increased maternal responsiveness to the child and retained more high-risk mothers than previous studies.
    a. **Beeber, L. S.,** Holditch-Davis, D., Perreira, K., Schwartz, T., Lewis, V., Blanchard, H., Canuso, R., & Goldman, B. (2010). Short-term, in-home intervention reduces depressive symptoms in Early Head Start Latina mothers of infants and toddlers. *Research in Nursing & Health*, 33(1), 60-76. PMCID: PMC4096768.
    b. **Beeber, L. S.,** Schwartz, T., Holditch-Davis, D., Canuso, R., & Lewis, V. (2013). Parenting enhancement, interpersonal psychotherapy to reduce depression in low-income mothers of infants and toddlers: A randomized trial. *Nursing Research, 62 (2*), 82-90. PMCID: PMC4235749.
    c. McKechnie, A.C., Waldrop, J., Matsuda, Y., Martinez, M., Fields, C., Baker, M. J., & **Beeber, L. S.** (2018). Mothers' perspectives on managing the developmental delay of a child with considerations for contextual influences and maternal functioning. *Journal of Family Nursing, 24, 405-442.* DOI: 10.1177/1074840718780474 journals.sagepub.com/home/jfn. PMCID: PMC7386797.
    d. Waldrop, J., Ledford, A., Perry, L. C., & **Beeber, L. S.** (2018). Developing a postpartum depression screening and referral procedure in pediatric primary care. *Journal of Pediatric Health Care, 32,* e67-e73. doi: 10.1016/j.pedhc.2017.11.002. PMCID: N/A.

3. **Large-scale translation of our interventions for depressive symptoms and symptom related compromises in parenting will change home visiting practices with high-risk mothers, infants and toddlers nationwide.** Our team has built a body of work that documents the structure, cost, cost savings and feasibility of in-home embedded intervention for high-risk mothers, infants and toddlers. I am using the data from our RCTs, descriptive studies and related home visitor training projects to drive changes in home visiting practice programs targeting high risk mother-child dyads throughout the US. I was a core faculty on a HRSA-funded collaborative that implemented depression screening, referral and in-house care of depressed mothers in four national home visiting programs (Parents as Teachers, Home Instruction for Parents of Preschool Youngsters, Early Head Start, Healthy Families America - see Tandon, et al. 2020). I led a CTSA-funded study team that tested maternal depression screening, referral and personalized supportive care in Early Intervention, a federally funded program for all US 0-3-year-olds with a diagnosed developmental delay or disability. Subsequently, our team was funded by NIH/Eunice Kennedy National Institute for Child Health and Development (NICHD; R03) and a CTSA large pilot grant to test novel technologies to enhance verbal communication between depressed mothers and their EI-enrolled child in a translational care model. I currently lead a Hillman Innovations in Care grant that is using an embedded randomized clinical trial model to test the addition of depression and anxiety screening, referral and ongoing intervention to the Nurse Family Partnership (NFP), a preventative program in 43 US states, Native American tribes and the US Virgin Islands. We are testing a consultation-enriched implementation model versus standard implementation with 2300 nurses serving 30,000 high-risk, first-time mothers from early pregnancy through the child's second year. We are in our final year of the project, fully implementing the innovation and moving toward sustaining it in NFP programs nationwide.
    a. Beil, H., **Beeber, L. S**., Schwartz, T., & Lewis, V. (2013). Cost-effectiveness of alternative treatments for depression in low-income women. *Journal of Mental Health Policy and Economics, 16, 55-65.* PMCID: N/A.

b. Brooks, J., Beil, H., & **Beeber, L. S**. 2015 Apr;19(4):790-7. Maternal depressive symptoms and healthcare expenditures for publicly insured children with chronic health conditions. *The Maternal and Child Health Journal.* PMID: 25047785. doi: 10.1007/s10995-014-1570-4. PMCID: PMC5553197
c. **Beeber, L. S.,** Meltzer-Brody, S., Martinez, M., Matsuda, Y., Wheeler, A. C., Mandel, M., LaForett, D., & Waldrop, J. (2016 Oct 14. [Epub ahead of print]. Recognizing Maternal Depressive Symptoms: An Opportunity to Improve Outcomes in Early Intervention Programs. *Maternal and Child Health Journal*, 1-10. DOI 10.1007/s10995-016-2189-4. PMCID: PMC6555140.
d. Tandon, D., Arbour, M.C., Mackrain, M., **Beeber, L. S.**, Topping-Tailby, N. Raska, M. (2020). Addressing maternal depression in home visiting: Findings from the Home Visiting Collaborative Improvement and Innovation Network. *PlosOne, 15(4)*: e0230211. doi: 10.1371/journal.pone.0230211. eCollection 2020. PMCID: PMC7161976.

Complete List of Published Work in MyBibliography:
http://www.ncbi.nlm.nih.gov/sites/myncbi/linda.beeber.1/bibliography/41149462/public/?sort=date&direction=ascending

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

Hillman Foundation Innovations in Care Beeber (PI) 1/1/2018-12/31/2021
Implementation of a Mental Health Innovation in the Nurse-Family Partnership
This multisite study will launch and implement an enhancement to the national Nurse-Family Partnership clinical model that will prepare 2,300 nurse home visitors serving 30,000 families to identify, refer, provide interventions and manage crises with mothers who have significant levels of depressive symptoms and anxiety and measure the impact on nurse competence and maternal and child outcomes.
Role: PI

T32 NR007091 Santacroce, Leeman (MPIs) 09/01/06-06/30/21
Interventions for Preventing and Managing Chronic Illness
Now in its fifth round of funding, this training program supports the development of nurse scientists and provides them training in the design, conduct, translation, and implementation of theory-based interventions to prevent and manage chronic illness in populations that are vulnerable due to their socio-economic status, race/ethnicity, age, or rural location.
Role: Faculty

Completed Research Support

1 R03 HD086330-01 Beeber/Wheeler (MPI) 03/01/16-02/28/18 NCE 2/28/19
Enhancing Communication of EI Children with their Depressed Mothers
This two-phase project will test the feasibility of integrating into Early Intervention (EI) services an intervention to screen mothers for depressive symptoms and help them increase their child-centered speech and reciprocal communication using a technology-supported Language ENhancement Assessment/intervention system (LENA).
Role: MPI

CTSA Large pilot grant Wheeler/LaForett (MPIs) 10/01/16-09/30/17
North Carolina Translational and Clinical Sciences Institute
Integrating the Language Environment Analysis (LENA) system in Early Intervention to Support Mothers of Infants and Toddlers with Disabilities
This pilot project will test the feasibility and acceptability of the LENA verbal interaction technology with mothers who have children with a variety of developmental delays, early autism or other challenges.
Role: Co-I

N/A Beeber (PI) 03/01/15-12/30/18
John M. Fox Family Foundation Trust Grant
Augmenting the Nurse Family Partnership (NFP) to Enhance Support for Depressed and Anxious First Time, High Risk Mothers
The purpose of this study is to use existing and additional data from the five US states in which the augmentation has been piloted and reconstruct a depression and anxiety augmentation into a hybrid online and face-to-face scalable format suitable for implementation in all NFP programs in the US, Virgin Islands and tribal nations.
Role: PI

CTSA Large pilot grant Beeber (PI) 2/1/13-10/30/14
North Carolina Translational and Clinical Sciences Institute
A UNC-Community Partnership to Enhance Outcomes for Infants and Toddlers with Suspected Disability who are Enrolled in Early Intervention Services
The purpose of this study is to document the prevalence, severity and impact of depressive symptoms on mothers of infants and toddlers with suspected disabilities and determine the feasibility of an in-program intervention. Role: Co-PI with Dr. Samantha Meltzer-Brody

R34 MH86553 Beeber (PI) 7/1/09-5/31/11
The "Wings" Depressive Symptom Intervention for Latina Mothers
The purpose of this study is to test the feasibility, acceptability and safety of a brief intervention to help Latina mothers with depressive symptoms and limited English proficiency along with supporting scientific methods.
Role: PI

R01 MH65524 Beeber (PI) 06/01/03-2/28/10
Reducing Depressive Symptoms in Low-Income Mothers
The purpose of this study is to test a brief intervention to help mothers with depressive symptom management, solution of life issues, access to social support, and parenting interactions with their infant or toddler. Role: PI

90YF0056 Beeber (PI) 09/01/06-12/31/08
DHHS/ACF
Alumbrando el camino/Bright Moments
The project will develop and implement a curriculum that will strengthen EHS staff in reaching out to English and Spanish-speaking parents who have significant depressive symptoms. Role: PI

90YF0042 Beeber (PI) 09/1/02-08/31/07
Dept of Health & Human Services/ACF
EHS Latino Mothers: Reducing Depression and Improving Infant/Toddler Mental Health
The purpose of this study was to examine the effectiveness of an intervention for low-income mothers with high levels of depressive symptoms. Outcome expected to be improved by the intervention are maternal depressive symptoms and the quality of mother-infant interactions. Role: PI

2 R01 NR05263 Holditch-Davis (PI) 09/30/01-06/30/07
A Nursing Support Intervention with Mothers of Preterms
This study examines the effectiveness of a culturally congruent intervention focused on resolving emotional distress, supporting relationships with their infants, and identifying resources to meet infant needs for rural, African American mothers of premature infants. Role: Co-Investigator

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Baiming Zou

eRA COMMONS USER NAME (credential, e.g., agency login): baiming

POSITION TITLE: Assistant Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Wuhan University, Wuhan, China	B.S.	07/1989	Physics
University of Wisconsin, Madison, WI	M.S. M.A.	07/1999	Computer Science Physics
University of North Carolina, Chapel Hill, NC	Ph.D.	12/2013	Biostatistics

A. Personal Statement

This application for the pre-doctoral training of Harry Adynski, RN, BSN, will be supported by my statistical expertise. Mr. Adynski requires further training and knowledge on longitudinal methods, regression analysis, and experience testing for mediation. I plan to provide opportunities for learning and guidance to reach his goals and complete the proposed study. I have extensive experiences in robust observational data modeling and analysis, scientific computation, software development, with expertise in big electronic health record (EHR) data research and applications. I have a specific training and expertise in the statistical modeling for big EHR data, repeated measurement data, longitudinal clinical study data, such as semi-parametric and non-parametric modeling for data from both observational and longitudinal clinical studies. In addition, I have more than nine years of commercial software development and scientific computation experiences with IBM. I also have solid biostatistics foundations, rich translational science collaboration research experiences, expertise and motivation necessary to successfully lead and carry out the proposed research project.

As a faculty member with joint appointment with Department of Biostatistics and School of Nursing at the University of North Carolina - Chapel Hill, I collaborate with multidisciplinary scientists and experts by providing high quality statistical support and offering cutting-edge study designs for their various scientific research projects. I am involved in several NIH-funded grant projects as a co-investigator and biostatistician providing my statistical expertise and collaboration experiences in translational science.

Based on my extensive statistical and scientific experiences, I have been often invited as a referee for many scientific journals including *Nature, PLOS ONE, BMJ, Statistics in Medicine,* etc. The following selected peer-reviewed publications represent my expertise in these areas. As a result of these experiences, I am aware of the importance of frequent communication among project members and of constructing a realistic research plan, timeline, and budget. The current application builds logically on my prior work and expertise.

a. **B. Zou**, J. Cai, G.G. Koch, H. Zhou, and F. Zou (2017) “A model-based conditional power assessment for decision making in randomized controlled trial studies”. *Statistics in Medicine*, 36(30): 4765~4776. PMCID: PMC5995155.

b. **B. Zou**, F. Zou, J.J. Shuster, P.J. Tighe, G.G. Koch, H. Zhou (2016) “On variance estimate for covariate adjustment by propensity score analysis”. *Statistics in Medicine*, 35(20): 3537~3548. PMCID: PMC4961520.

c. B.N. Alzghoul, R. Reddy, M. Chizinga, A. Innabi, **B. Zou**, E.S. Papierniak, I. Faruqi (2020) “Pulmonary Embolism in Acute Asthma Exacerbation: Clinical Characteristics, Prediction Model and Hospital Outcomes”. *Lung*, 198(4): 661~669. PMCID: N/A.

d. P.J. Tighe, C.D. King, **B. Zou**, R.B. Fillingim (2016). ``Time to Onset of Sustained Postoperative Pain Relief (SuPPR): Evaluation of a New Systems-level Metric for Acute Pain Management". *Clinical Journal of Pain*, 32(5):371~379. PMCID: PMC4744146.

B. Positions and Honors

Positions and Employment

2020- Assistant Professor, Department of Biostatistics, UNC – Chapel Hill, Chapel Hill, NC
2013-2019 Research Assistant Professor, Dept of Biostatistics, University of Florida, Gainesville, FL
2008-2013 Graduate Research Assistant, Dept of Biostatistics, UNC – Chapel Hill, Chapel Hill, NC
2000-2009 Software Engineer, IBM, Silicon Valley Lab, San Jose, CA and Research Triangle Park, NC

Other Experience and Professional Memberships

2010- Member, American Statistical Association
2010- Member, Eastern North American Region
2014- Member, Association of Clinical and Translational Statisticians

Honors

Early Career Award, Association of Clinical and Translational Statisticians (2015)

C. Contributions to Science

1. My most recent research efforts involved the semi-parametric modeling of observational data on how to adjust for the complex confounding structures of these types of data, and machine learning methods on how to predict clinical outcomes accurately and robustly. We developed robust yet efficient statistical models for adjusting complex confounding structures of electronic health record (EHR) data by using a joint modeling and machine learning technique. Part of our proposed methods had been applied to a set of postoperative pain and asthma studies as shown in the following selected publications:

   a. **B. Zou**, F. Zou, J.J. Shuster, P.J. Tighe, G.G. Koch, H. Zhou (2016) “On variance estimate for covariate adjustment by propensity score analysis”. *Statistics in Medicine*, 35(20): 3537~3548. PMCID: PMC4961520.

   b. P.J. Tighe, C.D. King, **B. Zou**, R.B. Fillingim (2016). “Time to Onset of Sustained Postoperative Pain Relief (SuPPR): Evaluation of a New Systems-level Metric for Acute Pain Management". *Clinical Journal of Pain*, 32(5):371~379. PMCID: PMC4744146.

   c. B.N. Alzghoul, R. Reddy, M. Chizinga, A. Innabi, **B. Zou**, E.S. Papierniak, I. Faruqi (2020) “Pulmonary Embolism in Acute Asthma Exacerbation: Clinical Characteristics, Prediction Model and Hospital Outcomes”. *Lung*, 198(4): 661~669. PMCID: N/A.

2. My other research focused on addressing the statistical design issues and analytical challenges of repeated measurement data in clinical translational studies. We proposed and developed very general and powerful statistical analysis procedures to address the need for practical biomedical research. Our proposed analytic schemes incorporated the model selection and testing procedures such that not only all available data from every measurement time point are used but also the information from the optimal model deemed for the data is used. Therefore, our proposed methods are more robust to missing data and more powerful than the traditional strategies. Our proposed analytic procedures had been

successfully applied to an array of clinical and biomedical studies related to cognitive disease, postoperative pain, cardiovascular disease as shown in the following selected publication list:

a. S.E. Borst, J.F. Yarrow, C. Fernandez, C.F. Conover, J.R. Meuleman, M. Morrow, **B. Zou**, J.J. Shuster (2014). "Cognitive effects of testosterone and finasteride administration in older hypogonadal men". *Clinical Interventions in Aging*, 2014(9): 1327~1333. PMCID: PMC4136953.

b. S.E. Borst, J.J. Shuster, **B. Zou**, F. Ye, H. Jia, A. Wokhlu, J.F. Yarrow (2014) "Cardiovascular Risks and Elevation of Serum DHT Vary by Route of Testosterone Administration: a Systematic Review and Meta-analysis". *BMC Medicine*, 12:211: 1~16. PMCID: PMC4245724.

c. P.J. Tighe, L. Le-Wendling, A. Patel, **B. Zou**, R.B. Fillingim (2015) "Clinically derived early postoperative pain trajectories differ by age, sex, and type of surgery". *Pain*, 156(4): 609~617. PMCID: PMC4367128.

3. In addition to the contributions described above, with a team of collaborators, I directly proposed and developed highly robust statistical analysis and testing procedures for clinical research in the investigations of diabetes, infectious disease, and metabolism. I developed nonparametric testing schemes to address the analytic challenges due to small sample size and very skew distributions in a set of biomedical pilot studies as represented in the following list of publications:

a. M.J. Haller, S.E. Gitelman, P.A. Gottlieb, A.W. Michels, S.M. Rosenthal, J.J. Shuster, **B. Zou,** T.M. Brusko, M.A. Hulme, C.H. Wasserfall, C.E. Mathews, M.A. Atkinson, D.A. Schatz (2015). "Anti-thymocyte globulin/G-CSF treatment preserves β cell function in patients with established type 1 diabetes". *Journal of Clinical Investigation*, 125(1): 448-455. PMCID: PMC4382237.

b. L. Villanueva, T. McCabe, E.F. Egelund, **B. Zou**, V. Vijayan, and C. Peloquin (2015). "Voriconazole Monitoring in Children with Invasive Fungal Infections". *The Journal of Pediatrics Pharmacology Therapeutics*, 20(1): 17~23. PMCID: PMC4353195.

c. L. Beggs, J.F. Yarrow, C.F. Conover, J.R. Meuleman, D. Beck, M. Morrow, **B. Zou**, J.J. Shuster, and S.E. Borst (2014). "Testosterone alters Iron metabolism and Stimulates Red Cell Production Independently of Dihydrotestosterone". *American Journal of Physiology*, 307(5): E456-61. PMCID: PMC4154071.

Complete List of Published Work in MyBibliography:

https://www.ncbi.nlm.nih.gov/myncbi/browse/collection/49856950/?sort=date&direction=ascending

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

R01 HS026473 Beeber, Anna (PI) 08/01/2019 - 05/31/2022
AHRQ
A Safer Assisted Living: Creating a Toolkit for Person and Family Engagement
Goal: Through a stakeholder-engaged, mixed methods study, we will identify assisted living (AL) safety problems, determine strategies to increase person and family engagement (PFE) in AL from the perspectives of residents, family caregivers, and professional stakeholders. We will rank AL safety problems and evaluate existing PFE interventions, tools, and strategies applied to other healthcare settings for their fit with AL to develop a testable toolkit to improve PFE in AL safety.
Role: Co-Investigator

R21 EB027865 Kiefer, Adam (PI) 07/01/2019 - 05/31/2021
Leveraging Artificial-Intelligence to Profile and Enhance Phenotypic Plasticity for Second Injury Prevention: An Innovative Precision Medicine Platform to Revolutionize Injury Care
Goal: To relieve suffer from second injury and the negative effects that lead to poorer long-term health; to optimize new precision assessment and treatment strategies to prevent injury, and this will enhance health and reduce the burden of athletic injury.
Role: Co-Investigator

Completed Research Support

R41MC33088-01-00 Angell, Amber (PI) 09/01/2019 – 08/31/2020
MCHB/HRSA and University of Florida
Autism Field-Initiated Innovative Research Studies Program
Goal: The objective of this project is to characterize the prevalence of co-occurring conditions and overall healthcare utilization among in girls with ASD using the OneFlorida Data Trust.
Role: Co-Investigator 09/01/2019 – 12/31/2019. Subcontract PI 01/01/2020 – 08/31/2020

R01AR071431 Allen, Kyle (PI) 03/01/18 – 02/28/2023
OA Pathogenesis beyond Cartilage: A Preclinical Study of the Sources of OA Pain
Goal: This proposal will investigate how changes in knee structure, inflammation, and the peripheral nervous system contribute to the progression of osteoarthritis and the development of osteoarthritis-related symptoms using rodent models of knee osteoarthritis. In addition, this proposal will investigate how exercise modulates these factors and leads to an improvement of osteoarthritic symptoms.
Role: Co-Investigator

1R01HD091658-01A1 Hegland, Karen (PI) 09/01/17 - 08/31/2021
Mechanisms of Airway Protection Dysfunction in Parkinson's Disease
Goal: The long-term goal of this research is to advance the management of airway protection deficits in patients with neurodegenerative disease in order to decrease morbidity and mortality due to aspiration related lung infection.
Role: Co-Investigator

1R01FD005407-01 Stacpoole, Peter (PI) 06/01/2016 – 05/31/2020
Phase 3 Trial of DCA in PDC Deficiency IND 028,625
Goal: This application will investigate the age-related developmental changes in amount, activity and properties of an enzyme, glutathione transferase Z1 (GSTZ1), known to determine the duration of action of dichloroacetate, and implicated in the side effects of this drug, which vary with age and genetic make-up. Dichloroacetate is a metabolic regulator and anticancer investigational drug in clinical trials for use in children and adults; while GSTZ1 converts dichloroacetate to an inactive metabolite, this drug also inactivates GSTZ1, resulting in slower elimination of dichloroacetate, and build-up of toxic endogenous substrates of GSTZ1. This research will help us better understand these variations, and tailor treatment to the individual patient.
Role: Co-statistical PI

1R01GM114290-01 Tighe, Patrick (PI) 07/01/15 – 06/30/2020
Finding Good TEMporal Postoperative Pain Signatures (TEMPOS)
Goal: This project examines how postoperative pain scores change with respect to time, and the impact of these temporal patterns on the risk for persistent postsurgical pain. These experiments will first demonstrate that there are many different, complex patterns of pain score changes over time after surgery, rather than the currently-established linear pain trajectories offered in the literature. Next, these experiments will determine how clinical, biological, psychological, and social factors predispose patients to different patterns of pain-analgesia-pain cycles, and finally determine how these timing patterns may influence the development of persistent postsurgical pain.
Role: Co-investigator

R01EY024564-01A1 Li, Qiuhong (PI) 09/01/2015 – 08/31/2020

Oral Therapy for Diabetic Retinopathy using ACE2/Ang1-7 Bioencapsulated in Plant Cells

Goal: The overall goal of this application is to evaluate the therapeutic efficacy of oral delivery of Ang1-7 and ACE2 bioencapsulated in plant cells in the prevention and treatment of diabetes-induced retinopathy in suitable animal models, understand the protective mechanisms, and to advance this novel concept towards translational studies.

Role: Co-investigator

1R21DC014567-01 Hegland, Karen (PI) 04/01/15 - 03/31/2017

Airway Protection Deficits According Stimulus Type in Parkinson's Disease

Goal: To advance the management of airway protection deficits in patients with neurodegenerative disease in order to decrease morbidity and mortality due to aspiration related lung infection.

Role: Co-investigator

PHS Fellowship Supplemental Form

Introduction

1. Introduction (for Resubmission applications)	

Fellowship Applicant Section

2. * Applicant's Background and Goals for Fellowship Training	Adynski_BackgroundAndGoals1046480178.pdf

Research Training Plan Section

3. * Specific Aims	Adynski_SpecificAims1046480179.pdf
4. * Research Strategy	Adynski_ResearchStrategy1046480180.pdf
5. * Respective Contributions	Adynski_RespectiveContributions1046480181.pdf
6. * Selection of Sponsor and Institution	Adynski_SelectionSponsor1046480182.pdf
7. Progress Report Publication List (for Renewal applications)	
8. * Training in the Responsible Conduct of Research	Adynski_ResponsibleConduct1046480183.pdf

Sponsor(s), Collaborator(s) and Consultant(s) Section

9. Sponsor and Co-Sponsor Statements	Adynski_SponsorCoSponsorStatement1046480174.pdf
10. Letters of Support from Collaborators, Contributors and Consultants	Adynski_LettersofSupport1046480185.pdf

Institutional Environment and Commitment to Training Section

11. Description of Institutional Environment and Commitment to Training	Adynski_InstitutionalEnvironment1046480175.pdf
12. Description of Candidate&s Contribution to Program Goals	

Other Research Training Plan Section

Vertebrate Animals

The following item is taken from the Research & Related Other Project Information form and repeated here for your reference. Any change to this item must be made on the Research & Related Other Project Information form.

Are Vertebrate Animals Used? Yes ✔ No

13. Are vertebrate animals euthanized?

If "Yes" to euthanasia
Is method consistent with American Veterinary Medical Association (AVMA) guidelines?
If "No" to AVMA guidelines, describe method and provide scientific justification

14. Vertebrate Animals

PHS Fellowship Supplemental Form

Other Research Training Plan Information

15. Select Agent Research

16. Resource Sharing Plan

17. Authentication of Key Biological and/or Chemical Resources Adynski_AuthenticationBiological1046480177.pdf

Additional Information Section

18. Human Embryonic Stem Cells

Does the proposed project involve human embryonic stem cells?* Yes ✔ No

If the proposed project involves human embryonic stem cells, list below the registration number of the specific cell line(s) from the following list: http://stemcells.nih.gov/research/registry/. Or, if a specific stem cell line cannot be referenced at this time, please check the box indicating that one from the registry will be used:

Specific stem cell line cannot be referenced at this time. One from the registry will be used.

Cell Line(s):

19. Alternate Phone Number:

20. Degree Sought During Proposed Award:

Degree:	If "other", indicate degree type:	Expected Completion Date (MM/YYYY):
PHD: Doctor of Philosophy		12/2023

21. * Field of Training for Current Proposal: 230 Nursing Science

22. * Current Or Prior Kirschstein-NRSA Support? Yes ✔ No

If yes, please identify current and prior Kirschstein-NRSA support below:

Level*	Type*	Start Date (if known)	End Date (if known)	Grant Number (if known)

23. * Applications for Concurrent Support? Yes ✔ No

If yes, describe in an attached file:

24. * Citizenship

U.S. Citizen U.S. Citizen or Non-Citizen National? ✔ Yes No

Non-U.S. Citizen With a Permanent U.S. Resident Visa

With a Temporary U.S. Visa

If you are a non-U.S. citizen with a temporary visa applying for an award that requires permanent residency status, and expect to be granted a permanent resident visa by the start date of the award, check here:

25. Change of Sponsoring Institution Name of Former Institution:*

PHS Fellowship Supplemental Form

Budget Section

All Fellowship Applicants:

26. * Tuition and Fees:

None Requested ✔ Funds Requested

Year 1	$12,114.00
Year 2	$4,534.00
Year 3	
Year 4	
Year 5	
Year 6 (when applicable)	
Total Funds Requested:	$16,648.00

Senior Fellowship Applicants Only:

27. Present Institutional Base Salary: Amount Academic Period Number of Months

28. Stipends/Salary During First Year of Proposed Fellowship:

a. Federal Stipend Requested: Amount Number of Months

b. Supplementation from other sources: Amount Number of Months

Type (e.g., sabbatical leave, salary)

Source

Appendix

29. Appendix

APPLICANT'S BACKGROUND AND GOALS FOR FELLOWSHIP TRAINING

A. DOCTORAL DISSERTATION AND RESEARCH EXPERIENCE

Undergraduate Training (Psychology, 2011-2016). I earned a Bachelor of Science (BS) in Psychology at the University of North Carolina (UNC) at Chapel Hill. I entered UNC on a full need-based scholarship, coming from a low-income single parent household. I focused my coursework in neuroscience, health, and developmental psychology, developing research methodology and statistical skills. During my senior year I studied abroad at the University of Glasgow, Scotland where I furthered my interest in the intersection of social adversity, psychological distress, and health. During my undergraduate studies I was also a NCAA Division 1 athlete and captain on the fencing team. My experiences as an athlete taught me essential teamwork and leadership skills that will serve me well in research working in multidisciplinary teams. Through my athletic and academic performances, I earned an athletic scholarship during my final two years, and a varsity letter and Atlantic Coast Conference (ACC) Academic Honor Roll for each year. I also volunteered in multiple health delivery settings, including an inpatient hospital, long term care facility, and community home visiting program. My coursework, volunteer, and personal experiences helped me develop my passion and interest in addressing social adversity, psychological distress, and the health of vulnerable populations.

Undergraduate Training (Nursing, 2016-2018). At the end of my psychology training, I decided to pursue a degree in nursing as the next step toward my goal of improving the health of vulnerable populations. During my senior year I was accepted into the 2-year BS in Nursing (BSN) program to pursue further clinical education relevant to my interests. I was selected for two major scholarships upon acceptance to the BSN program: the James M. Johnston Undergraduate Nursing Scholarship and the Katherine Wilson Memorial Scholarship. I also pursued a Nursing Assistant certification and worked part-time on the inpatient float pool at UNC Medical Center (UNC-MC), exposing me to multiple clinical settings. As a Research Assistant (RA), I worked in the Developmental Neuroscience Lab on *Project Neuroteen* (5R01DA039923-05, PI Telzer); a longitudinal study that explored peer and parental roles in neurobiological development during adolescence. I gained experience with essential research skills including recruitment, data management, and facilitation of neuroimaging and stress hormone experimental protocols. I was encouraged to apply and was selected into the Hillman Scholars Program in Nursing Innovation, an accelerated and integrated pre-licensure BSN to PhD program. As a Hillman Scholar I fast-tracked my nursing research and clinical career trajectory through extensive research and leadership training, and mentorship on my honors thesis from an NIH-funded researcher, Dr. Hudson Santos. I completed my undergraduate training with a double major in Nursing and Psychology, earning highest honors in nursing, earning dean's list for five semesters, and became a licensed Registered Nurse (RN).

Scientific Productivity: Working with my co-sponsor, Dr. Hudson Santos—who is an expert in early life adversity and genomics assessment related to child development—I developed and published my honors thesis entitled "Predictors of psychological distress in low-income mothers over the first postpartum year", in *Research in Nursing & Health (1)* . In this manuscript I used data collected by the NIH's Child Community Health Network to explore how social determinants of health and allostatic load (a 10-item index of biologic indicators of chronic stress) predicted psychological distress (stress, depression, and anxiety symptoms) in low-income pregnant women over time. This project allowed me to develop and integrate my research interests in *social adversity, psychological distress, and health*. I presented my findings through a poster presentation at the 2018 Academy Health Annual Conference.

PhD Training (2018-current). A key aspect of the Hillman Scholars Program is the opportunity to work clinically as an RN at UNC-Medical Center within the Clinical Scholars Fellowship. In this fellowship, I spent my first year in the PhD program working in the neuroscience hospital. In addition to 40 hours a week of clinical work, the fellowship included coursework that fostered clinical and research skills, developing clinically informed research questions, and stakeholder analyses. Typically, students take one required PhD nursing course in addition to the fellowship requirements. I took two required PhD nursing courses and one elective to expedite my research development. The clinical fellowship fostered my interest in *social adversity and early risk factors for emotional health regulation and psychological distress.* Many of the patients I saw experienced significant barriers to treatment, cycling through our unit multiple times. During the fellowship, I met my mentor Dr. John Gilmore and became involved in the Early Brain Development Study (5U01MH070890-15, PI Gilmore), a longitudinal study exploring child neurodevelopment and early risk factors for schizophrenia and bipolar disorders.

During the second year of my PhD program, I entered full-time coursework and continued to work 12 hours a week clinically to integrate my research and clinical practice. I accepted a North Carolina Excellence Fellowship, which is offered to students with strong academic achievement across all graduate departments at UNC. I began

participating in the Nursing Research Council within UNC-Medical Center, which oversees all research and quality improvement projects in the UNC healthcare system. I learned how to review project proposals, improving my skills for evaluating projects on scientific premise, feasibility, rigor, and human subjects protection. Additionally, I have been serving as a trainee in Dr. Santos NIH funded studies. At the end of my second year, I completed all my required nursing courses and passed my qualifying exam. At this point in my training I need to expand upon my current knowledge to develop advanced statistical skills applicable to longitudinal research. My previous research training fostered my passion in a line of inquiry that informs nurse led early intervention for children and their families to promote positive child health and well-being. This F31 award will provide structured training and mentorship beyond my required PhD coursework to develop child development, longitudinal analysis, and nursing intervention development expertise.

Scientific Productivity**:** During my first two years in the PhD program, I have developed my research and dissemination skills under my mentoring team's guidance: Drs. Santos (nursing), Propper (psychology), Beeber (nursing), Gilmore (medicine), and Zou (biostatistics). I published a first-authored manuscript, entitled "Does participation in food benefit programs reduce the risk for depressive symptoms?" in the *Journal of the American Psychiatric Nurses Association* as an extension of a PhD coursework project building upon my first publication findings. This manuscript used a nationally representative sample from the Center for Disease and Control and Prevention's Nutritional Health and Nutrition Examination Survey. Our findings indicated that high levels of food insecurity were significantly associated with elevated risk for depressive symptoms, while participation in food benefit programming was not. I presented a poster of the findings at the 2020 Council for the Advancement of Nursing Science's State of Science Congress on Nursing Research. With my mentors, I contributed as a second author on a manuscript entitled "Biopsychosocial correlates to psychological distress in Latina mothers" (under review in *Journal of Affective Disorders*), which explored the associations among psychological distress, social factors (e.g., discrimination, economic hardship) and DNA methylation of stress-related genes. With my student peers I co-authored a manuscript entitled "Minimally-invasive methods for examining biological changes in response to chronic stress: A scoping review", published in the *International Journal of Nursing Studies* (2) . These projects align with my research interests and expanded my skills in the bio-social factors associated with psychological distress, and analyses of large-scale datasets. Lastly, as recognition of my emerging productivity, I was invited to be a reviewer for Research in Nursing & Health.

Summary: Across my undergraduate and graduate studies I have refined my research interests to integrate the exploration of early modifiable risk factors, social adversity, psychological distress, and health. I have published three manuscripts in nursing journals, and currently have one manuscript under review. I have presented my findings at national conferences and participate as an active trainee in my co-sponsors' research and review for a nursing journal. Furthermore, I have demonstrated a commitment to research and clinical practice, highlighting my potential to develop into an independent nurse researcher and setting the stage for this F31 NRSA award. This award will allow me to receive necessary training above and beyond the PhD curriculum in child emotional health development, longitudinal analysis, and nursing intervention development to start a research program to explore the longitudinal impact of social adversity on emotional health regulation throughout childhood.

Proposed Doctoral Dissertation. I have passed my qualifying exams and will complete and present my dissertation proposal to my committee by Spring 2021. The dissertation will explore social adversity's role in emotional health regulation from early childhood and related academic performance implications. My dissertation will use a three-paper format based on longitudinal analyses using existing data from the Durham Child Development Study (Durham Study); a unique dataset with the advantage of almost a decade of data collection on child emotional health regulation. I will work extensively with Dr. Santos (co-sponsor), Dr. Propper (co-sponsor), and my other dissertation committee members (Dr. Beeber, Dr. Gilmore, Dr. Zou) to complete my training and dissertation work. This F31 award will allow me to develop strong research skills focused on social adversity, child health and development, and longitudinal design and data analysis, which will be essential for me to successfully secure a competitive postdoc position.

B. GOALS FOR FELLOWSHIP TRAINING AND CAREER

My **long-term goal** is to become an independent nurse scientist conducting research exploring the interaction between social adversity and child health and development to inform interventions development, clinical care, and policy. My goal is to prevent or minimize negative social, emotional, and health outcomes related to social adversity. This F31 will provide a unique opportunity to build and hone skills necessary for conducting longitudinal research on the social conditions that impact child health, development, and well-being. After completing my PhD, I will expand my training to include intervention research in a postdoctoral fellowship. My ultimate goal is to develop and lead an interdisciplinary research program to promote child equity, health, and wellness among

vulnerable populations.

The following **short-term training goals** are necessary for gaining the skills that will set me on a pathway to develop as a successful independent nurse scientist and put me in a strong position to achieve my long-term career and research goals see **Table 1**.

Table 1: List of Short-Term Goals and Mentorship

Goal	Mentorship
1. Expand expertise in the effects of early life adversity on child development and emotional health regulation.	Santos, Propper,
2. Develop methodological and analytic skills in longitudinal approaches.	Santos, Propper, Zou
3. Acquire knowledge in evidence-based nursing intervention development and clinical translation.	Santos, Beeber
4. Expand career development and team science skills.	Santos, Propper, Beeber Gilmore

GOAL 1: Expand expertise in the effects of early life adversity on child development and emotional health regulation. As part of my nursing and PhD education, I have taken courses exploring the impact of social adversity on health across the lifespan through extensive core curriculum coursework addressing social determinants of health (see completed coursework in Biosketch). My publication record indicates my experiences exploring social determinants of health as predictors for psychological distress. However, I have not had formal training in child development to complete my dissertation work. I have selected a complementary set of graduate coursework, mentorship, and hands-on experiences to provide me with the necessary training in child development and emotional health regulation and related functional outcomes during childhood **(Table 2)**. My mentoring team will help me develop my expertise in working with high-risk populations through mentored research experiences within their active studies. Dr. Propper will integrate me into her ongoing R01 "Brain and Early Experience (BEE)" study which explores the impact of poverty on child development. I will serve as research assistant in Dr. Santos's R01 on social, genetic and epigenetic influences on trajectories of child development. I will attend lab meetings with Dr. Gilmore's R01 study "Early Brain Development Study (EBDS)". Furthermore, I will utilize extensive resources in the Psychology department as well as the Frank Porter Graham Child Development Institute, where my co-sponsor Dr. Propper is on the leadership team. Drs. Santos, Propper, and Gilmore have extensive expertise and active research in child development and through individual mentorship and integrative research experiences will oversee my training in child emotional health development.

Table 2: Planned Activities to Achieve Goal 1

Type of Activity	Planned Activities	Frequency
Content Development	• PSYC 781 Proseminar in Developmental Science (Fall 2020) • EDUC 762: Child Development and Disability (Spring 2021)	Weekly
Hands on Training	• Engage in mentored research on Dr. Propper's Brain and Early Experience (BEE, 5R01HD091148-03) in which I will attend team meetings and participate in recruitment, data collection, and data processing • Work as Research Assistant (RA) for Social, Genetic and Epigenetic Influences on Trajectories of Child Development (1R01NR019245-01) led by Dr. Santos	Weekly throughout the F31
Other Activities	• Attend meetings Early Brain and Development Study (EBDS, 5R01MH111944-04) research group led by Dr. Gilmore (Bi-Weekly, Year 2) • Attend events and seminars within the Carolina Consortium on Human Development hosted by the Frank Porter Graham Child Development Institute, coordinated by Dr. Propper	Monthly throughout the F31
Anticipated Products	• Understand key concepts and theoretical frameworks related to child development • Develop knowledge and gain hands-on experience with research methods, study design, and measurement appropriate for the assessment of child development • Develop skills in analytical techniques used to examine associations between early adversity and child developmental outcomes • Coauthored Manuscript from participating in Dr. Propper's BEE lab • Coauthored Manuscript from participating in Dr. Santos' lab	

GOAL 2: Develop methodological and analytic skills in longitudinal approaches. I have developed basic longitudinal analytical skills in secondary data analyses through my required nursing coursework and emersion in independent and collaborative research experiences with Dr. Santos. To complete the proposed study, I will need to advance my methodological and analytic skills in longitudinal designs and analysis. I will take graduate-level statistical coursework and online short courses within the UNC Odum Institute for Research in Social

Science. Dr. Zou, a biostatistician, will serve as a mentor on my dissertation committee and oversee my statistical training and my application of it to the study analysis. I have selected a complementary set of graduate coursework, mentorship, and hands-on experiences to provide me with the necessary training to advance my knowledge and skills in longitudinal methods **(Table 3).**

Table 3: Planned Activities to Achieve Goal 2

Type of Activity	Planned Activities	Frequency
Content Development	• SOWO 917 Longitudinal and Multilevel Analysis (Fall 2021)	Weekly
Hands on Training	• Engage in mentored research on Dr. Santos' child development grants (1R03HD101413-01, 1R01NR019245-01) through data analysis and manuscript development • Prepare dataset for the manuscripts for dissertation aims under Drs. Zou, Propper, and Santos guidance • Conduct analysis with support from statistician Dr. Zou • Interpret results with my mentoring team and explore alternative analyses and approaches	Weekly during Year-1
Other Activities	• Utilize *Odum Institute* to further acquire longitudinal methods knowledge: "*Introduction to Longitudinal Analysis"* • Utilize Odum Institute to expand programming skills: R Short Course: "*Statistics and R*"	Yearly, as offered
Anticipated Products	• Clean and analyze data from the Durham Study [source of data for this award] to achieve the research aims in the proposed research project • Co-Authored Manuscript: Publication from participating in Dr. Santos R01	

GOAL 3: Acquire knowledge in evidence-based nursing intervention development and clinical translation. To become an independent nurse researcher, I will need to expand upon my dissertation work and research experiences to develop, test, and translate evidence-based nursing interventions into clinical practice to reduce the burden of emotional health dysregulation in children and promote health equity. To prepare me for my next steps in research to follow this study, I will take coursework and attend seminars and short courses in methodology on intervention development, testing, and translation into clinical practice. Dr. Beeber will oversee my training, providing support to conceptualize intervention mapping, intervention design, and testing evidence-based nursing interventions based on her extensive in clinical trials work aimed at reducing maternal stressors and prevent adverse maternal-infant outcomes (5R01MH065524-05, 5R03HD086330-02). As a result, I will be prepared to write a competitive postdoctoral fellowship application in which I plan to engage in intervention design **(Table 4).**

Table 4: Planned Activities to Achieve Goal 3

Type of Activity	Planned Activities	Frequency
Content Development	• NURS 957 From Theory to Intervention (Fall 2021) • NURS 958 Designing Intervention Studies (Spring 2022)	Weekly
Hands on Training	• Participate in bi-weekly meetings with Dr. Beeber's research team to expand knowledge in intervention mapping and development (Year 1)	Bi-weekly
Other Activities	• Attend T32/Research Support Center Scientific Seminars	Weekly
Anticipated Products	• Understand key concepts and theoretical frameworks related to intervention development and clinical translation • Learn how to conduct intervention mapping in the process of intervention development • Develop knowledge on evidence-based intervention scale up strategies	

GOAL 4: Expand career development and team science skills. In complement to the first three short term goals, goal four addresses my long-term career goal of leading an interdisciplinary research program. I will need to continue to expand my team science skills through professional career development **(Table 5**, next page**)**. Towards this end, I will continue to act as a reviewer for the Nursing Research Council at UNC-Medical Center and with *Research in Nursing & Health*. I will continue to develop leadership skills through active participation in mentoring undergraduate and early PhD students within the Hillman Seminar course. To further develop leadership and team science skills I will participate in my mentoring team's active research teams and participate in manuscript development above and beyond my required three paper dissertation. These experiences will

assist in learning leadership, team management, conflict resolution, and communication skills. Furthermore, I will disseminate my dissertation and training plan manuscripts though publication and presentation. The dissemination forums will be at national and international conferences, and peer-reviewed nursing and interdisciplinary research journals.

Table 5: Planned Activities to Achieve Goal 4

Type of Activity	Planned Activities	Frequency
Content Development	• NURS 675 Hillman Seminar (Fall, Spring throughout PhD Program)	Weekly
Hands on Training	• Attend and participate in Dr. Santos' R01 working group (weekly) • Attend and participate in weekly Brain and Early Experience lab meetings (Propper, Weekly, Year 1) • Attend and participate in weekly Early Brain Development lab meetings (Gilmore, monthly, Year 2) • Attend and participate in weekly lab meetings with Dr. Beeber's team (Biweekly, Year 1)	Weekly, Bi-Weekly, or Monthly
Other Activities	• Reviewer activities (*UNC-MC Nursing Research Council* and *Research in Nursing & Health*)	Yearly
Anticipated Products	• Prepare and Submit scholarly work for presentation at Regional, National, and International Conferences (e.g., SNRS, CANS, and APA)	

B. ACTIVITIES PLANNED UNDER THIS AWARD

The following table (see **Table 6**, next page) overviews the proposed coursework, training activities, and research experiences that will allow me to meet my short-term training goals. It also includes the anticipated time devoted to each training activity (research, coursework, and professional development). This training plan will allow me to develop into a competitive post-doctoral candidate and ultimately an independent nurse scientist. I plan to apply to the National Clinician Scholar's Program and the T32 at the University of Pennsylvania: Research on Vulnerable Women, Children and Families (5T32NR007100-20) in order to further my research training.

Productivity: In addition to my three dissertation manuscripts, I will have the opportunity to become further integrated into the labs of my mentoring team (Drs. Santos, Propper, Beeber, and Gilmore) and will be provided opportunities to coauthor other manuscripts for publication. These additional publication opportunities will be in topics directly relevant to my training plan as they will include either longitudinal analyses, child emotional health development, or translational science work. Additionally, I will actively disseminate these works through national and international conferences (SNRS, CANS, and APA). Although the publication plan is ambitious within this training plan, I have the necessary support and guidance within my strong mentorship team.

Assessment of Training Progress: Dr. Santos will oversee my mentorship team and will be involved in the outlined activities to achieve all four short-term training goals. Drs. Propper and Santos will oversee goal 1, Dr Zou will oversee goal 2, Dr. Beeber will oversee goal 3, and Drs. Santos, Propper, Beeber, and Gilmore will oversee goal 4. Twice a year we will meet as a team to discuss my progress, identify potential problems, and adjust the training plan as needed.

Progress through the Program: The following table summarizes how my training plan relates to my progress through the PhD Nursing Program (see **Table 7**). This F31 NRSA award will provide the structure and training to develop my knowledge and expertise in early childhood emotional health outcomes and longitudinal methods skill set to inform future nurse led evidence-based intervention development and translation. Furthermore, it will allow me to advance my career development and team science skills, facilitating becoming an independent nurse researcher. I intend to work within an interdisciplinary team to advance understanding early child development and psychological health and well-being to promote positive child health and wellness among at risk populations equitably. This F31 award will provide me with the needed training to secure a competitive post-doc and reach my long-term goal of securing a tenure-track faculty position in a research-intensive School of Nursing.

Table 7: Progress Through the PhD Nursing Program

Milestone	Timeline								
	2020			2021			2022		
	S	Su	F	S	Su	F	S	Su	F
Complete Core PhD Nursing Coursework	X								
Write Qualifying Exam	X								
Complete Elective Courses		X	X	X	X	X	X		
Defend Dissertation Proposal				X					
Analyze Data				X	X	X	X		
Write and submit 3 paper dissertation					X	X	X	X	
Defend Dissertation									X

Table 6: Proposed Coursework and Training Activities

ACTIVITY	2020	2021			2022			Training Goal
	F	S	Su	F	S	Su	F	
Coursework								
NURS 675 Hillman Scholars Seminar (1cr.)	X	X		X	X		X	4
NURS 957 From Theory to Intervention (3cr.)				X				3
NURS 958 Designing Intervention Studies (3cr.)					X			3
PSYC 781 Proseminar in Developmental Science (3cr.)	X							1
EDUC 762: Child Development and Disability		X						1
SOWO 917 Longitudinal and Multilevel Analysis (3cr.)				X				2
NURS 994 Dissertation (3cr.)	X	X	X	X	X	X	X	1,2,3,4
Additional training activities and research experiences								
Attend weekly Brain and Early Experience Lab Meetings (Propper)	X	X	X	X				1,4
Participate in recruitment, data collection, and data processing of the BEE study		X	X	X				1
Attend Dr. Santos' R01 working group	X	X	X	X	X	X	X	1,2,4
Participate in the data analysis and publication call of the Predictors of Longitudinal Childhood Development (Santos)	X	X	X	X	X	X	X	2
Attend Dr. Beeber's research team meetings		X	X	X				1,2,4
Attend weekly Early Brain Development lab meetings (Gilmore)					X	X	X	1,2,4
Attend biweekly T32/Research Support Center Scientific Seminars	X	X	X	X	X	X	X	3
Attend Carolina Consortium on Human Development seminars	X	X	X	X	X	X	X	1
R Short Course: "Statistics and R"				X				2
Participate in Odum Institute for Social Sciences short courses on Longitudinal Analysis	X	X	X	X	X	X	X	2
Dissertation Manuscript: Aim 1 Social Adversity and Emotional Health Dysregulation			X	X	X	X	X	1,2,3,4
Dissertation Manuscript: Aim 2 Emotional Health Dysregulation and Academic Performance			X	X	X	X	X	1,2,3,4
Dissertation Manuscript: Aim 3 Mediation of Maternal Characteristics			X	X	X	X	X	1,2,3,4
Co-authored Manuscript: Publication from participating in Dr. Santos' R01		X	X	X	X	X	X	1,2,4
Co-authored Manuscript: Publication from participating in Dr. Propper's BEE lab	X	X	X	X	X	X	X	1,2,4
Prepare and Submit scholarly work for presentation at Regional, National, and International Conferences (e.g., SNRS, CANS, and APA)				X	X	X	X	1,2,3,4
Time Devoted to Training Activity								
Activity	**2020**	**2021**			**2022**			
Research	60%	50%			85%			1,2,3,4
Coursework	30%	40%			5%			1,2,3,4
Professional Development	10%	10%			10%			1,2,3,4

Note: Su= Summer, F=Fall, S=Spring, X=proposed course/activity

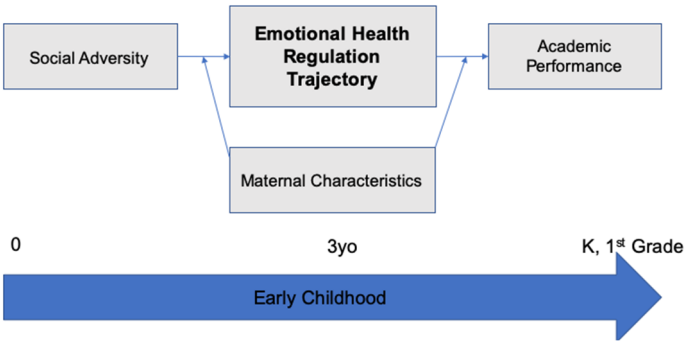
SPECIFIC AIMS

Emotional health is one of the cornerstones for wellness and well-being across the lifespan(3-5). Emotional health regulation (the ability to manage attention, affect, and behavior) directly affects child health and development (6) setting the pathway for their ability to manage health behaviors and meet their full social and economic potential. An improved understanding of factors that can affect emotional health regulation is essential to improve long term social (7), economic (8), and physical and mental health outcomes (4, 9-17). Unfortunately, emotional health problems are pervasive among pre-school age children with estimates as high as 26% (18), and particularly prominent among vulnerable children who experience social adversity (19), defined as socioeconomic exposure of hardship. Social adversity has been identified as a strong factor associated with emotional health dysregulation (20), and mechanisms that can mitigate this negative association are largely unknown. School entry is a critical point for caregivers, teachers, and school nurses to identify and intervene children suffering from emotional health problems (21-26). Academic performance is an early functional outcome of emotional health regulation with impacts on both internalizing and externalizing behaviors (11, 27-31). Addressing early emotional health regulation can support regulation for healthy behaviors in adolescence and adulthood (32, 33). Parenting sensitivity and executive functioning are potentially modifiable factors that can be targeted to mitigate the impact of social adversity on child emotional health regulation (34-37). In this study, I will work with my mentors to determine the mediating effect of maternal characteristics on social adversity, emotional health regulation trajectories, and academic performance across infancy to early childhood.

The proposal's **overall hypothesis** is that social adversity is associated with worsening (-) trajectories of child emotional health regulation. Furthermore, we hypothesize that maternal characteristics (i.e., high executive function and high levels of parenting sensitivity) will reduce social adversity's effects on emotional health regulation, a critical indicator of future wellness and wellbeing. This proposal builds on my experience evaluating the effects of social adversity on perinatal health(1), and my mentors prior work showing that social adversity has implications for parenting sensitivity and child emotional development (38-41).

The Developmental Origins of Health and Disease (DOHaD) framework will be used as a model to explore the impact of early life social adversity exposures on emotional health development (42-46). This framework allows for the exploration of modifiable risk factors, such as parenting sensitivity and executive functioning, amenable to intervention in order to reduce the impact of social adversity on child wellness across the lifespan (47). This study will use **existing longitudinal data** (N=175) from the Durham Child Development Study (Durham Study), which is managed by my co-sponsor, Dr. Cathi Propper. The Durham Study evaluated child development and physiologic regulation in mother-child dyads through home, laboratory, and school visits from infancy to early childhood. The proposed study expands on the parent study by exploring the effect of social adversity on emotional health regulation trajectories and academic performance during early childhood across a 7-year period (**Figure 1**). The **specific aims** for this proposal are to:

Figure 1. Overview of Specific Aims



Aim 1. Determine early life social adversity's effect on emotional health regulation trajectories from ages 0 to 3 years.

Aim 2. Determine whether emotional health regulation trajectories associate with academic performance outcomes (kindergarten, 1st grade).

Aim 3. Identify whether modifiable maternal characteristics (i.e. executive function and parenting sensitivity) mediate the association of **(a)** social adversity to emotional health regulation trajectories, and **(b)** emotional health regulation trajectories to academic performance.

This study is **significant** as it addresses early life social adversity as a key driver of child wellness via emotional health regulation. The results can inform nursing interventions aimed to reduce the effects of social adversity to promote emotional health regulation. The promotion of emotional health regulation will have short- and long-term implications on wellness and wellbeing. This proposal aligns with the NINR Strategic Plan's Focus of Wellness: Promoting Health and Preventing Illness as it aims to understand modifiable factors amenable to intervention to reduce or prevent long term adverse health outcomes related to emotional health dysregulation (4, 9-17, 48).

RESEARCH STRATEGY

Significance

Child emotional health regulation is a key health outcome as it has implications for wellness and well-being, and affects developmental milestones through effects on academic, social and economic functioning (8, 32, 33). Early in life, social adversity, defined as socioeconomic exposure of hardship, is a strong predictor for poor emotional health regulation in children**.** Therefore, it is critical to understand of developmental trajectories of emotional health regulation and related factors which may be barriers to promoting child health, wellness, and well-being. We will address this barrier by exploring modifiable factors such as maternal executive functioning and parenting sensitivity that can be targeted for future intervention to improve child emotional health outcomes.

Social adversity is a key risk factor for early-life emotional health dysregulation. Emotional health dysregulation is pervasive early in life, and particularly salient among vulnerable children who experience social adversity (19). Social adversity, often operationalized using household income and parental education (49), is associated with children's socioemotional functioning, cognitive functioning, and behavioral problems (20, 50-55). Although measures of household income and parental education are the most common social adversity factors used to explore early childhood developmental outcomes (56-59), other socioenvironmental exposures have been implicated including material hardship (i.e. food, housing insecurity)(60), insurance status (61), dietary quality (59, 62), neighborhood conditions (60, 63), rurality (60), and single-parent households (56). A *limitation* in this literature is a lack of consistent operationalization of social adversity factors as they include individual, family, societal, and cultural factors. One approach to address this limitation is to use a composite index score of social adversity that includes both poverty level household income and other risk factors (64). Our study will use a composite risk score to have a more holistic measure when exploring social adversity as a predictor for child emotional health regulation trajectories. Understanding the cumulative effect of social adversity can better estimate social adversity's extent of influence in emotional health regulation development.

Emotional health regulation is a key aspect of child functioning and is associated with long term health and wellness. Emotional health regulation sets the stage for a child's ability to self-manage health behaviors. On the other hand, emotional health dysregulation can lead to risky behaviors, impaired relationships, psychopathology, and physical illness across the lifespan (9-17). Emotional health regulation is necessary for early social and academic success which includes new social and cognitive challenges. Academic performance, an early functional outcome of emotional health regulation, is a useful reflection of a child's ability to successfully develop habits to manage their emotions, attention, and behaviors (11, 29-31). Academic performance has long term implications for individuals' health and their ability to reach full social, vocational, and economic potential across the lifespan (32, 33, 65, 66). As children enter school, early signs of emotional health dysregulation and poor academic performance are often identified by caregivers, teachers, and school nurses based upon child behavior and targeted for referral and further intervention (21, 26). Addressing early emotional health regulation and academic performance can support healthy behaviors in adolescence and adulthood. Many of these studies explore emotional health regulation cross sectionally, highlighting a need for longitudinal analyses to understand the critical time points to inform screening and intervention. Our study will determine emotional health regulation trajectories and related functional outcomes (academic performance) at school entry.

Maternal executive function and parenting sensitivity may mediate the effect of social adversity on child emotional health regulation. Child emotional health regulation is dependent on external sources of co-regulation, including parents' executive functioning with their ability to regulate their own emotions and attend and respond to their child's needs (34). Low maternal working memory levels (a feature of executive functioning) is associated with increased negative reactivity to their child, harsh reactive parenting, and increased child behavioral problems (67, 68). Mothers with high overall executive functioning are more likely to engage in positive parenting including warmth, monitoring, involvement and consistency compared to mothers with low levels of executive functioning indicating maternal executive functioning essential in sensitive parenting (37, 69).

High levels of parental sensitivity, the ability to notice child signals, correctly interpret those signals, and respond promptly and appropriately (70, 71), have been associated with positive child emotional health regulation and academic performance (25, 35, 39, 72-79). A *limitation* of these studies is they do not simultaneously explore the intersection of maternal characteristics and social adversity in early life on the child's trajectories of emotional health regulation and academic performance outcomes (80). Maternal executive functioning and parenting sensitivity are potential targets for intervention to address child developmental issues and their influence on the child's health, functioning, and wellbeing (36). Our study will contribute to this body of knowledge by exploring maternal executive functioning and parenting sensitivity as potential mediators in the relationship between early life social adversity on child emotional health regulation trajectories and academic performance.

Summary of the Prior Rigor of Research

We build upon the knowledge generated to date regarding social adversity in early life, child emotional health regulation, and academic performance. Despite rigorous studies available they have some limitations: 1) There has been a lack of integration in terms of exploring risk factors within the relationship between social adversity, emotional health regulation, and early academic performance; 2) Previous studies are primarily cross sectional and thus we have limited understanding of social adversity as a predictor of emotional health regulation over time. Longitudinal measures allow for increased confidence in the association of the relationship and can help determine critical periods where the association may be stronger warranting intervention; 3) Social adversity risk factors are inconsistently operationalized and are typically limited to income and parental education despite other pertinent identified individual, family, cultural, and societal factors. Few studies integrate social adversity indices, with some of these studies conducted by my mentoring team (38, 81).

This proposal takes strong advantage of the robust knowledge developed to date, and addresses the limitations described earlier. The proposed study will (1) explore early social adversity risk factors associated with emotional health dysregulation trajectories and academic performance; (2) operationalize social adversity as an index to explore mechanisms of emotional health regulation; (3) integrate social adversity factors, maternal characteristics, and emotional development as key drivers of academic performance; and (4) stands to inform future intervention via modifiable factors by exploring the mediation of maternal characteristics as mediators of the effects of social adversity on emotional health regulation and academic performance.

Conceptual Framework

The conceptual framework (**Figure 1,** On Specific Aims Page) for the proposed research was developed from the Developmental Origins of Health and Disease (DOHaD) hypothesis to explore early social adversity as a predictor of emotional health regulation trajectories and school entry functional outcome (academic performance). I will utilize existing data from the Durham Study to operationalize social adversity as a composite index (38) to explore its utility as a predictor of emotional health regulation trajectories in early childhood. The trajectories of emotional health regulation will be used to explore academic performance at kindergarten and first grade controlling for relevant cognitive, social, and behavioral factors. Maternal characteristics, including executive functioning and parenting sensitivity, will be explored as potential mediators between social adversity, emotional health regulation trajectories, and academic performance. This study will have implications on child emotional health and academic performance outcomes, which are related to health, functioning, and wellbeing. An improved understanding of these relationships can help develop targeted multilevel interventions to improve child emotional health regulation thus academic performance, which has long term implications on social, occupational, and health outcomes.

This study is innovative in the following ways: **(a) Utilizes a composite index of social adversity** to explore the influence of social adversity factors and maternal characteristics on key emotional health regulation development related to future academic performance; **(b) Explores mediation of maternal parenting sensitivity and executive function** as potentially modifiable factors which could be targeted for future nursing intervention by adapting existing interventions to be accessible and feasible for mothers of children experiencing social adversity in early life. **Specifically, this proposal addresses the NINR Innovative Questions in Wellness 2.2 and 2.7** (48) by exploring environmental context (social adversity), mediating factors designed to promote healthy behaviors in families (maternal executive functioning and parenting sensitivity), and innovative methods (trajectory analysis, use of existing longitudinal studies) to explore child health behavior (emotional health regulation) over time. <u>This study addresses the critical need to understand the conditions in which childhood emotional health dysregulation arise and modifiable factors to inform future intervention to promote wellness, positive child development, health, and wellbeing</u>.

Approach

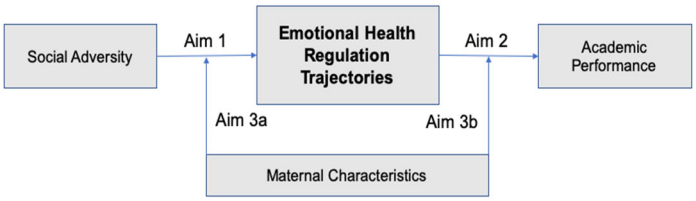
Parent Study: The *Durham Study* a longitudinal cohort study beginning in 2002 that explored early child development and physiologic regulation in mother-child dyads through multiple in-home, laboratory, and school visits spanning across infancy and into early childhood. The initial visit was conducted at three months, with final follow up visits completed at 2nd grade. The study took place in an urban community setting. All families from the original cohort were recruited from Durham, North Carolina, a medium-sized city with a majority non-white population, in the southern United States. The prevalence of poverty in Durham County is higher than state and national reports, indicating high social adversity (82, 83).

Sample Characteristics, Recruitment, and Attrition: The parent study enrolled a socioeconomically and racially diverse sample, which is essential for this training proposal. In 2000 the percentage of Latinx individuals in Durham County was 7.6%, and therefore were not recruited in order to make statistically meaningful group

comparisons (84). The prevalence of poverty in Durham County is higher than state and national reports, indicating high social The sample comprises approximately equal numbers of African American (52%) and European American (48%) families from lower (48% = < 200% federal poverty line (FPL)) and higher-income groups (>200% FPL) (85). The sample included a wide range of educational levels with 10% of mothers having no high school degree and 58% some college or more. Inclusion criteria included healthy full-term infants born without significant birth complications. A total of 206 infants and their families were recruited at baseline. At the 36-month follow-up, 175 children (51% male, 49% female) completed data collection (retention rate 84.95%) these data will be used for the proposed study.

Secondary Data: Data were collected at 3 months of age with follow-ups at 6, 12, 18, 24, 30, and 36 months, at kindergarten, 1st and 2nd grades. Data were collected through robust and well-validated physiological, observational tests, and questionnaires through home and laboratory visits. Laboratory visits included multiple assessments, including child emotional health regulation tasks. The proposed study takes advantage of the available data and adds to the parent study by determining emotional health regulation trajectories and associations with social adversity, functional outcomes (academic performance), and mediating factors (maternal executive function and parenting sensitivity) (**Figure 2**).

Figure 2. Overview of Study Aims



Research team. The mentoring team for this training proposal will provide the support and expertise needed to conduct the study successfully. Dr. Santos (Co-Sponsor) is an expert in longitudinal studies of social adversity, child development, and nursing genomics (40, 41, 81, 86, 87). Dr. Propper (Co-Sponsor) is an expert in early child development, emotional health regulation, early school readiness, and working with low-income populations **(25, 38, 39, 88)**. Dr. Beeber (mentor) is an expert in nursing intervention and translational research with high-risk populations including families with low incomes (23, 24, 89, 90). Dr. Gilmore (mentor) is an expert in child neurodevelopment and working with high-risk populations (91-95). Dr. Zou (mentor) is an expert in statistical methodology including longitudinal and mediation analyses (96). Together, my team has extensive expertise in conducting longitudinal studies and or work including child development relevant to this proposal.

Strategies to ensure scientific rigor and reproducibility. Each aim described below addresses the following to promote scientific rigor: the hypothesis, data collections measures with information to support their reliability and validity, and statistical analysis plan, power analysis, anticipated outcomes by each aim. Furthermore, a data sharing plan is provided to address reproducibility.

SPECIFIC AIM 1: Determine early life social adversity's effect on emotional health regulation trajectories from ages 0 to 3 years

Hypothesis: Children who experience higher social adversity levels early in life will have worsening (-) trajectories of emotional health regulation from age 0 to 3 years.

A) Primary Predictor: ***Social Adversity Index*****:** For this proposal, our team will use a social adversity index previously developed by my co-sponsor, Dr. Propper (38). Although there is not a common catalog of the individual social adversity factors to include in an index, Dr. Propper's team conducted a review of studies and identified the five most salient social adversity factors in the literature exploring child socioemotional development; these included marital status, maternal education, household income, number of children in the household, and mother's age at first birth. Using these factors, they developed an index that was then predictive of child executive functioning at school entry and was mediated by parenting sensitivity (38). The indicators of social adversity were dichotomized as risk (1) and no risk (0) and summed to get a total social adversity risk score between 0 to 5, with 5 indicating a higher degree of social adversity. For the cut-off scores of the individual social adversity measures see, **Table 1**.

Table 1. Social Adversity Index

Social Adversity Measure	Risk (1)	No Risk (0)
Marital Status	Non-Married	Married
Education	< diploma or GED	≥ diploma or GED
Income Needs Ratio	Income-Needs-Ratio (INR) < 1.3	INR ≥ 1.3
Number of Children	≥ 3 children in the household	≤ 2 children in the household
Age of mother at first childbirth	< 20 years old	≥ 20 years old

B) Covariates: *Maternal Psychological Distress*: Maternal mental health during pregnancy or the

postpartum period is associated with increased likelihood of impaired child development (97, 98). To control for maternal mood symptomology we will use the Brief Symptom Inventory (BSI) (99), a well validated tool (100), which assess for psychological distress (101).

C) Primary outcome: *Emotional health regulation trajectories:* The emotional health regulation data that will be used for the trajectories were collected in laboratory visits, using well-validated and developmentally appropriate assessments: Still Face (3,6 months), Arm Restraint (12 months), Barrier Task (24 months), Gift Wrap (36 months) see **Table 2**. These separate measures include emotional reactivity, expression, and control domains with developmentally **age-appropriate tasks** that provide comparable measures to explore the construct of emotional health regulation over time as a trajectory. Each score is reported as a continuous proportion from 0-100, indicating the percentage of time a child spent in negative or positive reactive state. The proportion of time spent in a negative state indicates lesser emotional health regulation. The trajectory of emotional health regulation will be measured as the rate of change of emotional health regulation over time, i.e. the slope of emotional health regulation score change over time. Using the slope derived from the four emotional health regulation measures across early childhood we will be able to determine the direction and magnitude of the change in emotional health regulation over time. Previous evidence suggests three emotional health regulation trajectories stable incline, decline, and catch up groups (19). **By using a slope for the emotional trajectory score we will be able to not only indicate improving (+) and worsening (-) trajectories, but also the magnitude of the change, which is clinically relevant information.** The derived slope will be used as the outcome variable of the emotional health regulation trajectory. Dr. Propper will oversee my training on interpreting emotional health regulation tasks' scores and their fundamentals.

Table 2. Developmentally Appropriate Emotional Health Regulation Measures

Measure	Time Point	Emotional health regulation assessment
Still-Face	3, 6 months	Examines infant's responses to disruption in social interaction with a parent (102-104).
Arm Restraint	12 months	Examines toddler's response to an arm restraint during interaction with a parent (105).
Barrier Task	24 months	Examines child impulse response to an inaccessible toy (105).
Gift Wrap	36 months	Examines child's impulse response to a delayed gratification task for a gift (105).

Data Analysis Plan: We will first conduct descriptive analysis on baseline features to examine the distributions of the continuous and categorical variables (e.g., the means and standard deviations for continuous variables and frequency and proportion for categorical variables). To determine the emotional health regulation trajectories, we will calculate the rate of change (slope) of the emotional health regulation assessments over time from 3 to 36 months of age. We will calculate the slope for each participant within the sample. We will adopt a multiple linear regression model to analyze the effect of social adversity on the trajectories. More specifically, the outcome (e.g., slope of emotional health regulation scores) will be included as the dependent variable and the social adversity index will be the primary independent variable by adjusting other confounding covariates (e.g., age and sex of the child, maternal psychological distress).

Expected Outcome, Potential Problems and Alternative Solutions: We will determine the longitudinal trajectories of emotional health regulation across early childhood and identify the effects of social adversity on these trajectories. The derivation of the slope score was selected over a Latent Class Growth Analysis (LCGA) to create discrete groups of emotional health regulation trajectory because the use of a slope of emotional health regulation scores will allow for both the direction and magnitude of change over time. Additionally, the use of a slope score over categorization through LCGA is superior because it allows us to distinguish differences in the patterns of emotional health regulation trajectories and avoids potential group size problems and reduces reductionism maintaining clinically relevant information. A potential limitation is that we are limited to the constraints of secondary data when exploring social adversity and additional factors may contribute to the outcomes under investigation. Our findings will contribute by exploring the utility of the index and inform future studies exploring social adversity measures.

SPECIFIC AIM 2: Determine whether emotional health regulation trajectories associate with academic performance outcomes (kindergarten, 1st grade).

Hypothesis: Worsening emotional health regulation trajectories (- slope) during early childhood will be associated with worse academic performance at kindergarten and 1st grade.

A) Primary predictor: *Emotional health regulation trajectories*: The emotional health regulation trajectory will be the derived slope, as the rate of change of the emotional health regulation scores over time as in Aim 1.

B) Covariates and Confounders: *Social Skills*: As mentioned previously, academic performance is based on a child's ability to integrate multiple developmental milestones across emotional, cognitive, and behavioral self-

regulation (106, 107). To better isolate the effect of emotional health regulation on academic performance we will control for social skills with the validated Social Skills Rating System for Teachers (SSRS) (108-111).

C) Primary Outcome: *Academic Performance:* Two well-validated measures were utilized to assess the child's academic performance. The first measure, **Woodcock Johnson III**, is a standardized and nationally normed achievement test (112). The second measure, the **Academic Performance Rating Scale**, is a teacher report of children's academic performance and abilities in classroom settings (113) (**Table 3**).

Table 3. Primary Outcome for Aim 2

Variable	Measure*	Definition and Validity
Academic Performance	Woodcock Johnson III	Includes two subscales the Letter-Word Identification and Applied Problems, which assesses for reading and decoding, quantitative reasoning, math achievement, and math knowledge (114-116).
	Academic Performance Rating Scale	Includes 19-item on teacher's perceptions of children's academic performance and abilities in classroom settings. Items assessed work performance in various subject areas, academic success, behavioral control in academic situations, attention to assignments, and the frequency of staring episodes and social withdrawal. Items were rated on a 6-point Likert scale and have previously shown to have strong reliability and validity(113, 117).

*all measured in K and 1st Grade

Data Analysis Plan: We will first conduct a descriptive analysis, then adopt multiple linear regression models to investigate the effects of emotional health regulation on academic performance outcomes. Specifically, in the multiple linear regression model, the academic performance will be used as the dependent variable with the emotional health regulation trajectory being included as the primary independent variable by adjusting other confounding factors such as social skills, child age, and child gender.

Expected Outcome, Potential Problems and Alternative Solutions. We expect to find that worsening (-) trajectories of emotional health regulation in early childhood are associated with poor academic performance outcomes at kindergarten and first grade as reported by the teachers. If our hypothesis is not supported, additional associations will be explored including concurrent associations between emotion regulation and teacher report of academic performance allowing us to understand whether change/stability of the trajectory over time is the most important versus emotional experience during the time of achievement assessments.

SPECIFIC AIM 3: Identify whether modifiable maternal characteristics (i.e. executive function and parenting sensitivity) mediate the association of (a) social adversity to emotional health regulation trajectories, and (b) emotional health regulation trajectories to academic performance.

Hypothesis: Maternal characteristics will mediate the relationship between social adversity to emotional health regulation and emotional health regulation to academic performance.

Mediating Variables: Two variables will be considered mediators for this analysis - **maternal executive functioning** and **parenting sensitivity** (**Table 4**). These variables will allow us to explore factors that may impact the relationship between social adversity and childhood emotional trajectories, and school outcomes.

Table 4. Mediating Maternal Characteristics for Aim 3

Construct	Measure (setting)	Procedure
Maternal Executive Functioning	Wisconsin Card Sort (laboratory visit)	This is a standardized test that examines an individual's problem solving ability by testing attention, working memory, and visual processing (118). Participants were presented with 128 stimulus cards differing in quantity, color, and shape and told to match the cards, but not the explicit the rules of how to match the cards. Participants guess the matching cards while the administrator provides feedback on whether the match is correct or incorrect, changing the rules as a part of the challenge until all the cards are used. Scoring is calculated based on the number of categories achieved, total errors, perseverative errors, and unique errors. These scores are normalized based upon standard reporting protocols (118).
Maternal Sensitivity	Parent Child Interaction Free Play (home visit)	Mean composite score of seven subscales (sensitivity, responsiveness, intrusiveness, detachment/disengagement, positive regard, negative regard, stimulation of cognitive development, and animation) of maternal behavior during a free play session with standardized toys coded on a scale from 1 to 5, indicating the degree to which the behavior characterized the interaction. The coding system was developed by the NICHD Study of Early Child Care (119) In the Durham Study, the Parent Child Interaction Play was constructed through factor analysis with high internal reliability alpha =.89 and inter coder reliability (>0.8)(120-122).

Data Analysis Plan: We will adopt a set of the following multiple linear regression models (123) to investigate the mediating mechanism of maternal characteristics on the two association relationships as specified in 3a) and 3b). **Figure 3** shows proposed mediating relationship for aims 3a and 3b. Specifically, in order to describe how each of the observed covariate (X) affects outcome (Y) directly and indirectly (i.e. through the mediator), we adopt the following mediation analysis models(124-126) by adjusting the confounding factors (C) {124-126] (see **Figure 4**). In the above modeling, Y, X, M represent dependent variable (i.e. **emotional health regulation trajectories (for 3a), academic performance (for 3b)), the primary independent variable (i.e. social adversity (for 3a), emotional health regulation trajectories (for 3b)), mediator (i.e. maternal characteristics), respectively, while C stands for a set of confounding factors including age, gender, ethnicity, social economic status, etc.** Here θ_1 is the direct effect, and the mediation effect is defined as: $m = \beta_1 \times \theta_2$. Though the estimate for each parameter in the above models can be obtained directly from multiple regression analysis, we will adopt the empirical bootstrap with replacement to estimate the variance of the mediation effect estimate m with 10,000 replications.

Figure 3. Mediation model

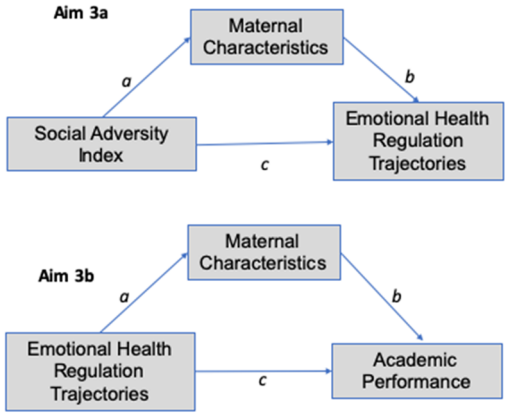


Figure 4: Regression Formulas

$$(1)\ \mathrm{E}(\mathrm{Y}|\mathrm{X},\mathrm{C}) = \alpha_0 + \alpha_1 X + \boldsymbol{\alpha}_2{}' C$$
$$(2)\ \mathrm{E}(\mathrm{M}|\mathrm{X},\mathrm{C}) = \beta_0 + \beta_1 X + \boldsymbol{\beta}_2{}' C$$
$$(3)\ E(Y|X,M,C) = \theta_0 + \theta_1 X + \theta_2 M + \boldsymbol{\theta}_3{}' C$$

Expected Outcome, Potential Problems and Alternative Solutions. We will determine if modifiable maternal characteristics mediate the proposed relationships (a) social adversity to emotion regulation, and (b) emotional health regulation to academic performance outcomes. Even if maternal behavior does not act as a mediator, we will be able to look more closely at the direct relationship between parenting behaviors and each child-level variable of interest (emotion regulation, academic performance) which will still provide pertinent information necessary for prevention and intervention work with parents.

Power Analyses: Power analysis is conducted based on the study design with n=175 sample size. Under this study design, the minimum association that can be detected with the given sample size via a two-sided test by controlling the type I error at 0.05 level with different powers to achieve are presented in **Table 5**.

Table 5: Power analysis

Association	Power
0.210	0.80
0.224	0.85
0.242	0.90
0.268	0.95

Sex as a biological variable*:* Previous findings suggest that there may be differences in emotional development based on the sex of the child(127-129) . Therefore, our analysis plan will explore the effects of the sex of the child on our outcomes of interest by adding sex interaction effects or conducting sex stratified analysis.

Data Management and Sharing Plan. Data from the Durham Study are currently stored on the University of North Carolina, Chapel Hill secure network. Data is be maintained on a secure network, deidentified of participant identifiers, and cleaned to contain only the variables of interest to my study. To promote this study's reproducibility, the code developed for data analysis of each aim will be saved to allow for future validation and verification by others. In cases of data sharing or data requests, both the original PI of the Durham Study, Dr. Cathi Propper, and the Institutional Review Board (IRB) will be consulted in order to protect the rights and privacy of the participants in the parent study.

Summary and Future Directions. Using Durham Study data, I have proposed to explore the role of social adversity on emerging emotional health regulation trajectories and the implications on academic performance across early childhood. An improved understanding of modifiable maternal sensitivity and executive functioning's mediating roles may be targeted in a future intervention. This work has potential to provide vital insight to guide future intervention studies that ultimately may help reduce negative impacts of emotional health dysregulation across the lifespan to promote health and wellness. I am confident that the study is feasible because I have access to the data, a strong multidisciplinary mentorship team, and a tailored accompanying training plan to ensure successful and timely completion of the study.

RESPECTIVE CONTRIBUTIONS

Preparing this training plan has been a collaborative process between myself, Dr. Santos (co-sponsor), Dr. Propper (co-sponsor), and mentors (Drs. Beeber, Gilmore, Zou). Dr. Santos is my dissertation chair and has been overseeing my training. As a Hillman Scholar in Nursing Innovation, I was accepted into the PhD program in nursing during my BSN program. Dr. Santos integrating me into his research starting with my honors thesis (1). Through this mentorship I have been able to conduct original research and collaborate on multiple projects. He continues to provide significant mentorship as I develop my research and professional skills. Drs. Santos and Propper have been actively involved in developing this proposal providing substantive feedback throughout the entire process. Additionally, Drs. Gilmore, Beeber, and Zou have been closely involved developing this proposal and training plan and serve on my dissertation committee. This interdisciplinary research team and dissertation committee is committed to supporting me completing my dissertation. The table below describes each mentor's contributions to the proposal's development and their role in conducting the proposed study.

Name/Position	Area of Expertise	Contribution to Training Proposal	Respective Role in Proposed Study
Hudson Santos, PhD, RN Assistant Professor, UNC School of Nursing Director, Biobehavioral Laboratory Director, Training & Mentorship Division, UNC Institute for Environmental Health Solutions	Early life stress, child development, longitudinal methodology, low-income populations, genomics, biobehavioral methodology	Dr. Santos has guided the development of every aspect of this proposal and continues to provide mentorship.	Dr. Santos is a co-sponsor on the proposed study and my dissertation chair. Dr. Santos and I meet in person weekly, and via e-mail as needed to discuss my progress and answer questions as they arise. He will continue to work closely with me throughout the proposed study.
Cathi Propper, PhD Adjunct Associate Professor, Senior Research Scientist Department of Psychology and Neuroscience, FPG Child Development Institute	Early child development, social-emotional, cognitive development, emotional self-regulation, biobehavioral sciences, maternal-infant physiology, early school readiness, low-income populations, longitudinal methodology	Dr. Propper has guided the development of the training plan sections and study conceptualization and design as the owner of the Durham Child Health and Development Study data used for a secondary data analysis for this proposal. She suggested formal coursework to develop knowledge on child development	Dr. Propper is a co-sponsor and dissertation committee member. Dr. Propper will provide access to the DCHDs data set for the proposed secondary data analysis. Additionally, Dr. Propper and Dr. Santos and meet monthly to discuss the progress of the proposal and training plan.
John Gilmore, MD Thad and Alice Eure Distinguished Professor, Vice Chair, Research & Scientific Affairs, Director, Center for Excellence in Community Mental Health School of Medicine UNC	Early child development, neurodevelopment, longitudinal methodology, neuroimaging, genetic and environmental contributions to development, high-risk populations, schizophrenia and bipolar disorders	Dr. Gilmore has provided mentorship and feedback throughout the development of this proposal.	Dr. Gilmore is a dissertation committee member. Dr. Gilmore will meet monthly during the Early Brain Development Study (EBDS) lab meetings to discuss progress on the proposal. As the owner of the EBDS he will provide additional immersive training opportunities.
Linda Beeber, PhD, PMHCNS-BC, FAAN Professor & Associate Dean, PhD Division and PhD Program School of Nursing UNC	Maternal-child health, Depressive symptoms in low income mothers, reaching high-risk underserved populations, early interventions for toddlers and infants with developmental delays	Dr. Beeber has guided the development of this study conceptualization and design.	Dr. Beeber is a dissertation committee member. Dr. Beeber will contribute to this proposal through feedback and immersive opportunities to develop intervention development skills.
Baiming Zou, PhD Assistant Professor Gillings School of Public Health and School of Nursing UNC	Longitudinal analyses, mediational analyses, multi-level analyses	Dr. Zou has guided the development of the statistical analysis plan and will support the analysis.	Dr. Zou is a biostatistician and dissertation committee member. He will contribute to this proposal by assisting in the design, analysis, and interpretation of findings.

SELECTION OF SPONSOR AND INSTITUTION

Co-Sponsor (Hudson Santos, PhD, RN): I selected Dr. Santos as my co-sponsor for his expertise and dedication to nursing research and mentorship. Dr. Santos is an Assistant Professor and Director of the Biobehavioral Laboratory at the UNC School of Nursing. He is also the Director of the Training and Mentorship Division in the UNC Institute for Environmental Health Solutions at the Gillings School of Global Public Health. Dr. Santos has expertise in longitudinal studies of social hardship, child development, and genomics, closely aligning with my research interests. His research focuses on exploring early life environmental conditions in which low-income women experience psychological distress and implications for their child's neurodevelopment. Dr. Santos uses novel methods to explore the underlining mechanisms by which environmental exposures impact maternal and child health disparities, including the use of epigenetic markers (DNA methylation), network analyses, and longitudinal methods. He is currently leading two studies funded by the National Institute of Nursing Research (NINR; 1R01NR019245-01; 1K23NR017898-01), and one study funded by the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD; 1R03HD101413-01). Dr. Santos' expertise and funded studies are a natural fit with the training and research proposed in this award. Furthermore, he has a strong history of mentorship through his director position at the School of Nursing Biobehavioral Laboratory and the UNC Institute for Environmental Health Solutions. He is also a faculty member in the School of Nursing "Interventions for Preventing and Managing Chronic Illness" NINR-T32 Program, and the Carolina Consortium on Human Development is an NICHD-T32. His commitment to and history of mentorship is evident through his role as an advisor to trainees within nursing and public health disciplines at multiple educational levels (BS, BSN, MA, and PhD). Dr. Santos has provided consistent feedback and support through face-to-face meetings, written critiques, and encouragement to become involved in research inquiry beyond the scope of required coursework. As his mentee, I have collaborated within his research network across multiple disciplines including nursing, public health, psychology, and medicine. Through these interdisciplinary connections I selected Dr. Cathi Propper as my co-sponsor for this proposal.

Co-Sponsor (Cathi Propper, PhD): Dr. Propper is a Senior Research Scientist and the Director of the Developmental Biobehavioral Lab and the Carolina Consortium on Human Development at the Frank Porter Graham Child Development Institute (FPG). She is a developmental scientist with expertise in behavior, cognition, and emotional health regulation during infancy and early childhood focusing on caregiving, parental sensitivity, biobehavioral processes, poverty, and early life stress. Dr. Propper has an extensive NIH funding history as a PI and Co-PI (R01HD091148, R21HD077146, R03HD055402). As one of the leaders in the Durham Child Health and Development Study (Durham Study), Dr. Propper will provide essential support to this proposal including data access and mentorship on early child development and social adversity. Furthermore, Dr. Propper and Dr. Santos collaborate in research through the FPG and the Institute for Environmental Health Solutions. They are both strongly committed to my training.

Training Environment/Institution: I chose to attend UNC School of Nursing (SON) for my pre-doctoral studies because of the rigorous training environment, and the commitment to fostering the next generation of nurse scientists. Within the SON I was able to find mentorship to develop my emerging research interests from experts in psychological health and early child development with my co-sponsor Dr. Santos, and mentor Dr. Beeber. In addition to strong mentorship, UNC has extensive training and scholarship opportunities including the Hillman Scholars Program allowing me to integrate my undergraduate and graduate studies. **The Hillman Scholars Program in Nursing Innovation** provides extensive mentorship and UNC is one of two schools in the United States offering this unique BSN to PhD integrated path. Additionally, the SON hosts the Office of **Research Support and Consultation (RSC**), which is specifically designed to provide resources and support to students conducting research through designing studies, mock review, statistical analysis, grant proposal support, grant processing, as well as hosting a biweekly T32 research seminar series. Also, UNC is the home to the **FPG,** one of the oldest multidisciplinary centers that study child health and development. Drs Santos, Propper, Gilmore, and Beeber are currently involved with FPG and will contribute to my understanding of early childhood development. Dr. Propper is the PI for the T32 **Carolina Consortium on Human Development** (CCHD; T32-HD007376), allowing me to further develop interdisciplinary skills and expertise in early childhood development and longitudinal methodology. Within the greater university system UNC has other research support through the **Odum Institute for Research in Social Science** which provides individuals short course training in quantitative and qualitative research methods and statistical support. Additionally, UNC has many opportunities to become immersed in research through interdisciplinary opportunities. My personal growth as a researcher is in part due to the opportunities and support available within UNC as a tier I institution. This has given me confidence that I can continue to grow and work towards my long-term goal of becoming an independent nurse scientist through continued support.

TRAINING IN RESPONSIBLE CONDUCT OF RESEARCH

Responsible conduct of research (RCR) has been included throughout my pre-doctoral studies and will be reinforced throughout my training in multiple formats including coursework, seminars, trainings, and 1:1 mentorship. I will be mentored in developing my knowledge in conducting RCR by my co-sponsor (Dr. Santos), co-sponsor (Dr. Propper), and mentors (Drs. Gilmore, Beeber, Zou). As the University of North Carolina at Chapel Hill is committed to training highly skilled scientists who are can conduct safe and ethical research. I can integrate many resources into my training plan. My training in RCR include:

Training/Subject Matter	Format, Duration, Frequency	Sponsor or Faculty Participation
Collaborative Institutional Training Initiative (CITI) Certification Self-learning modules include education on human subjects, conflicts of interests, data collection and management, informed consent, federal regulation, the responsibility to society, privacy and confidentiality, and vulnerable subjects.	Format: Online modules Duration: ~6 hours Frequency: Renewal every 2 years, Completion 2020, renewal 2022	Institutional Review Board (IRB) Content, considerations, and implications for this proposal will be reinforced with Dr. Santos
NC Transitional and Clinical Sciences (NC TraCS) Institute Responsible Conduct of Research Course Includes NIH required topics including human subject research conflict of interest, scientific and research misconduct, human subjects research, animal and laboratory-based research, peer review/authorship, data collection, storage, and management, NIH policies regarding publication, collaborations with industry and academe, and the mentor/mentee relationship	Format: Zoom lectures and discussions Duration: 3 days; 12 hours Frequency: Once Completion: 2020, renewal every 2 years	NC TraCS, Content, considerations, and implications will be reinforced with Dr. Santos.
HIPAA Orientation "General Privacy and Information Security" Self-learning module regarding maintaining privacy and security of protected health information protected by the Health Insurance Portability and Accountability Act of 1996	Format: Online module Duration: ~1 hour Frequency: Renewal every year	UNC School of Nursing Content, considerations, and implications to this proposal will be reinforced with Dr. Santos.
Peer Review Activities *UNC-MC Nursing Research Council (NRC), Psychiatric Service Line Representative* Reviewing proposals for research and quality improvement projects involving nurses within UNC Medical Center, UNC Hillsborough, UNC outpatient clinics, and UNC Wake brook.	Format: In-person, online Duration: N/A Frequency: Monthly meetings with ~4 proposal reviews completed/year	UNC Health Care Dr. Santos will mentor me through the process of providing critique as it relates to RCR.
Weekly Seminars *Hillman Seminar* A combination of faculty led presentations on research topics, mentorship, individual development, leadership, and scholarship. *T32/Research Support and Consultation (RSC)* Faculty-led scientific seminars on current research projects as well as implementation, dissemination, interdisciplinary teams, grant submission, data management, conflict of interest, research ethics, and responsible conduct of research.	Format: In-person Duration: Hillman: 2 hours weekly T32/RSC: 1 hour bi-weekly Frequency: Each Semester	UNC School of Nursing; The Office of Research Support and Consultation at UNC-CH School of Nursing
Coursework Including but not limited to the following courses *NURS 671 Nursing Inquiry and Advanced Scholarship*: Discussion and critical analysis on ethical considerations in conducting nursing research. *NURS 959 Grant Writing*: Discussion and critical analysis on ethical considerations in grant writing *NURS 963 Writing for Publication*: Discussion and critical analysis on ethical considerations in authorship, publication, and peer review. *NURS 976 Issues in Sampling and Design*: Discussion and critical analysis on ethical considerations in experimental, quasi-experimental, and observational designs. *NURS 977 Qualitative Approaches to Knowledge Development*: Discussion and critical analysis on ethical considerations in conducting qualitative research	Format: In-Person Duration: Time devoted to RCR varies per course Frequency: Each Semester	UNC School of Nursing
Individual Meetings with sponsors and advisors Responsible conduct of research in the context of this research proposal including guidance through IRB application, special considerations working with vulnerable populations including low income families and children.	Format: In-person Duration: ~1 hour Frequency: Weekly	Drs. Santos, Propper, Gilmore, Beeber, Zou During weekly lab or 1:1 meetings I will receive mentorship on RCR as it pertains to this proposal.

SPONSOR AND CO-SPONSOR STATEMENT

A. Research Support Available

Drs. Hudson Santos and Cathi Propper are Mr. Adynski's co-sponsors, and they have worked closely with Mr. Adynski to develop this application. Key research support available from Drs. Santos and Propper ongoing NIH funded research that is relevant to Mr. Adynski's training is summarized in **Table 1.** Additionally, the Hillman Foundation provides the mentor and co-mentor for Hillman Scholars such as Mr. Adynski with $500 per PhD program year to be used at their discretion which will be used to assist with dissemination activities as needed. Through guided mentorship Mr. Adynski will be provided opportunities to become involved in the ongoing project data collection, analysis, and manuscript development which will be critical to his research training**.** Mr. Adynski has worked closely with Drs. Santos and Propper to develop the proposed study. Drs. Santos and Propper are both committed to conducting in-person meetings with Mr. Adynski every one to two weeks as needed throughout his training period. Drs. Santos and Propper will meet with Mr. Adynski and his full mentoring team every semester to assess progress through his training plan and the proposed study as it develops.

Table 1. Research Support Available

Co-sponsors	Award Title	Funding Agency/Award Type	Award Period	Award Amount
Santos: PI	Genetic and Epigenetic Effects on Childhood Cognitive Trajectories	NINR R01-NR019245-01	9/2020-7/2025	$1,917,272
Santos: PI	Placental Origins of Positive Child Health Outcomes	NICHD R03-HD101413-01	4/2020-3/2022	$149,230
Santos: PI	Placental DNA Methylation, Maternal Hardship, and Child Neurodevelopmental Outcomes	NINR K23-NR017898-03	9/2018-8/2021	$394,592
Santos: Co-I	Environment, Epigenetics, Neurodevelopment & Health of Extremely Preterm Children	NIH OD 4UH3OD023348-03	9/2018-8/2023	$4,119,664
Propper: PI	Human Development Interdisciplinary Research Training	NICHD 5T32HD0073676-30	5-2019-4/2021	$2,839,000
Propper: PI	A Mechanistic Study of the Association Between Poverty and Executive Functions in Early Childhood: Contributions of Early Brain Development and the Early Caregiving Environment	NICHD 5R01HD091148-03	2/2018/-12/2022	$3,211,896
Propper PI	The Development of Gut Microbiota and Behavioral Inhibition in Childhood: The Role of Early Stress and Brain Development	NIMH 1R01MH122526-01A1	9/2020-6/2025	$3,633,602

B. Sponsor's Previous Fellows/Trainees

Dr. Santos has strong experience with mentoring graduate students. Dr. Santos is a core faculty member of the UNC School of Nursing T32 Interventions for Preventing and Managing Chronic Illness (2T32NR007091), and a member of the Executive Committee of the UNC T32 Human Development and Interdisciplinary Research Training (5T32HD0073676-30). He has previously mentored or co-mentored four pre-doctoral students, and one post-doctoral fellow. Currently, Dr. Santos is the primary mentor for three pre-doctoral students, and co-mentor or advisor for another three pre-doctoral students. In addition, Dr. Santos has mentored six master students, and 10 undergraduate honors students, with at least half of them moving on to be accepted in graduate school. Dr. Santos is also the Director of UNC Biobehavioral Laboratory and Director of the Training and Mentorship Division in the UNC Institute for Environmental Health Solutions (IEHS) at the Gillings School of Global Public Health. In this role, Dr. Santos leads a training program for undergraduate and graduate students that guide them towards securing publications and research funding. The IEHS program has successfully placed over 80% of our undergrade cohort into graduate programs, and all pre-doctoral trainees into postdoctoral positions across the nation. Selected mentees are presented in **Table 2**.

Table 2. Dr. Santos Selected Graduate Mentees

Trainee	Degree	Institution	Year	Dissertation or Master's Paper Title	Current Position
Jackie Bangman	Postdoc	UNC Gillings School of Public Health	2019-2020	N/A	Researcher, US Environmental Protection Agency
Kezia Addo	PhD	UNC Gillings School of Public Health	2018-2020	Translational Approach to Examine the Effects of Acetaminophen on the Placenta	Toxicologist; ICF Global Consulting
Cassandra Meakin	PhD	UNC Gillings School of Public Health	2018-2020	Inorganic Arsenic as an Endocrine Disruptor in the Placenta: Implications for the Glucocorticoid Receptor Singling Pathway	Post-Doctoral Researcher: Department of Pharmacology and Toxicology; Rutgers University
Becky Salomon	PhD	UNC School of Nursing	2016-2019	Psychoneurological Symptoms in Situationally Stressed Low Income Mothers	Post-Doctoral Scholar: Community Health Systems; University of California San Francisco
Patricia Freitas	PhD	University of Sao Paulo	2014-2016	Biobehavioral Regulation of Infant Response to NICU Stressors	Assistant Professor; University of Sao Paulo
Erin Burks	MSN	UNC Gillings School of Public Health	2017-2018	Do Neighborhood Characteristics Influence Preterm Birth?	Research Assistant; Family Planning National Training Center/ WHO Collaborating Center

Dr. Propper has extensive experience providing mentorship and training as she directs the T32 Human Development and Interdisciplinary Research Training Program (or Carolina Consortium on Human Development (CCHD); 5T32HD0073676-30) at UNC-Chapel Hill. Dr. Propper has previously mentored or co-mentored over 75 undergraduate students in her lab, 8 of which have completed honors theses. Since her faculty appointment in 2013, she has been the primary mentor of 6 doctoral students, co-mentor of 5 doctoral students, and 5 postdoctoral fellows. Since 2013, she has had many training roles at the Center for Developmental Science at UNC-CH and on the CCHD (T32) training program, as she transitioned from Assistant Director of Training and Research to Associate Director, and is currently the co-Director/PI of this grant. As such, she has helped to mentor trainees for the past 7 years (5 predoctoral fellows and 5 postdoctoral fellows per year). This includes developing and overseeing professional development opportunities, completion of IDPs and RCR training for all trainees, evaluations and progress reports with faculty mentors, and providing guidance and support for the search for postdoctoral positions or faculty positions at the completion of our program. Selected mentees are presented in **Table 3**.

Table 3. Dr. Propper Selected Graduate Mentees

Trainee	Degree	Institution	Year	Dissertation or Master's Paper Title	Current Position
Noa Gueron-Sela	Postdoc	UNC-Chapel Hill	2014-2016	N/A	Assistant Professor, Ben Gurion University
Marie Camerota	PhD Student	UNC-Chapel Hill	2014-2019	Evaluating a Latent Measurement Model for Infant Sleep: From Intrinsic and Extrinsic Predictors to Cognitive Outcomes	Postdoctoral scholar, Brown University
Leigha MacNeill	Postdoc	UNC-Chapel Hill	2019-2020	N/A	Research Scientist, Northwestern University
Steven Holochwost	PhD Student	UNC-Chapel Hill	2008-2013	Cumulative Risk, Parenting Behaviors,	Associate Professor, CUNY-Lehman

				and the Development of Executive Functions in Early Childhood: A Moderating Role for Physiological Self-Regulation?	College
Kristin Tully	Postdoc	UNC-Chapel Hill	2014-2016	N/A	Research Scientist, UNC-Chapel Hill

C. Training Plan, Environment, Research Facilities.

Overview of PhD in Nursing Program. The PhD in Nursing program at the University of North Carolina at Chapel Hill is committed to enhancing the health of individuals, families, and communities by developing interventions to prevent and manage chronic illness, increasing the effectiveness of health care systems, and furthering the translation of research into practice. Graduates are prepared to advance the theoretical and empirical underpinnings of nursing science, engage in interdisciplinary inquiry, and disseminate knowledge. The program reflects the goals of the National Institutes of Health (NIH) to foster discovery, increase the knowledge base for improving the health of all populations, and to reduce health disparities, with an emphasis on integrating the biological and behavioral sciences; developing and testing evidence-based, theoretically grounded interventions; and improving health care quality and outcomes. It also meets all of the indicators of a high-quality PhD program outlined in the Report from the American Association of Colleges of Nursing (AACN) Task Force on the Research-Focused Doctorate in Nursing, including a focus on developing the science, stewarding the discipline, and educating the next generation of nurse scientists. Faculty areas of research are focused on enhancing health in vulnerable populations, managing chronic health problems, and strengthening health care systems**.** The PhD program emphasizes the integration of biological and behavioral sciences; use of theory to develop, test, and implement precision nursing interventions; and improvement of health care quality and patient outcomes. Graduates engage in advanced research training and assume roles in academic and research settings. Toward that end, the program admits a small number of highly qualified students each year and supplements their coursework with mentored research, teaching and professional experiences to socialize them as future nurse scientists, reinforce the knowledge they are obtaining through coursework and develop their research competences. The PhD program encourages enrollment upon completing an entry-level degree in nursing or through the Hillman Scholars Program as a response to NINR's goal of promoting "early entry of nurses into research training programs" (NINR, 2011, p.28).

Graduate degree requirements include a minimum of 50 semester hours in graduate coursework, the qualifying examination, a dissertation with an oral dissertation proposal defense, and the final dissertation defense. Students in the PhD program enroll in a series of "foundational courses" (16 credits). These courses focus on the use of theory in scientific inquiry; skills to complete a systematic literature review; applying multiple modes of inquiry and analytic approaches to design and conduct research; understanding scientific integrity; and learning to translate research findings through multiple modes of dissemination to enhance knowledge and improve nursing practice and policy. These courses include:

- NURS 912: Theoretical Foundations of Scientific Inquiry (3 credits)
- NURS 959: Research Grant Writing (3 credits)
- NURS 962: Conducting Systematic Reviews & Writing Specific Aims (4 credits)
- NURS 963: Writing for Publication (3 credits)
- NURS 985: Research Practicum (3 credits)

Another series of required courses focuses on development of specific research competencies and are directed at the development of skills as a beginning nurse scientist:

- NURS 972: Statistical Models for Health Research (4 credits)
- NURS 976: Issues in Sampling and Design (3 credits)
- NURS 977: Qualitative Methods (3 credits)
- NURS 978: Principles of Measurement (3 credits)

In addition, students select 15 credits of electives (at least 6 credits from outside the SON) to increase their substantive and/or methodological knowledge in their chosen area of research. Students are required to complete a minimum of 6 dissertation credits (N994). Following completion of the 5 required courses typically taken in the first PhD program year, students write the qualifying examination (QE), a purpose of which is to

determine the student's ability to synthesize and apply knowledge across courses; students must pass the QE to proceed in the program.

Monitoring & Facilitating Student Progression to Program Completion: Students are required to develop an Individual Development Plan (IDP) in collaboration with their mentors. Throughout each semester students are expected to meet regularly with their Research Faculty Advisor/mentor and discuss the goals developed in the IDP. By the end of Year 1 students are to have developed a three-person advisory committee and expand this to a five-person dissertation committee. Once the dissertation committee has been established, they meet with the student to facilitate course planning as well as their overall development of research competencies. At the end of each semester the PhD progression Review Committee meets to review all students' grades and expected program milestones. Time to degree for students who have graduated in the past ten years has averaged at 5.5 years. Time from matriculation to dissertation proposal defense has been 4.5 years.

Mr. Adynski's Plan of Study

PhD Coursework

Mr. Adynski was accepted into the Hillman Scholars in Nursing Innovation Program, during his undergraduate studies. This program, funded by the Rita and Alex Hillman Foundation, aims to develop the next generation of nurse scientists to influence healthcare early in their careers. The Hillman Scholars Program was developed as an integrated BSN-PhD, with acceptance during undergraduate nursing studies. Scholars are connected to NIH-funded researchers and begin collaborating with mentors during their undergraduate honors thesis. This competitive program accepts 2-6 scholars into the program each year. As a Hillman Scholar, Mr. Adynski completed his undergraduate studies taking advanced graduate level research methodology course, participated in weekly Hillman Seminar (NURS675) providing opportunities to engage with nurse scientists and innovative leaders, and completed his honors thesis earning highest honors. During his first year in the PhD program (Fall 2018) Mr. Adynski completed the Hillman Scholars Clinical Fellowship, where he worked forty hours a week as a registered nurse in the adult inpatient psychotic disorder unit in the UNC Neuroscience Hospital. Here he gained insight into the challenges faced by individuals with severe mental illness and their caregivers, and the complexities of implementing evidence-based practice changes in clinical settings The fellowship is designed to transition Hillman Scholars from the BSN to PhD phase of the integrated program by grounding their research in at least 600 hours of clinical practice to integrate their clinical experiences to recent literature, identifying gaps, and generating research questions informed by clinical practice. Typically, scholars in the clinical fellowship take one nursing PhD course in addition to the accompanying fellowship courses (Clinical Scholars in Nursing I, II; NURS 901, NURS 902). These courses support students to integrate their clinical and research experiences as burgeoning nurse scientists. During the fellowship year, Mr. Adysnki took additional coursework including an extra PhD Nursing Core course and a PhD elective to expedite his training. During his second year of the PhD program Mr. Adynski entered fulltime coursework and completed the above foundational and mandatory nursing coursework as well as developed his interdisciplinary mentorship team. Upon Spring 2019 he completed and successfully passed his Qualifying Exam. He continues to take additional coursework in preparation for his dissertation. His dissertation proposal defense is scheduled for Spring 2021 and his defense of a three-paper dissertation in Fall 2022.

Other Training Activities. Mr. Adynski also had and will continue to have a number of research immersion experiences with his mentorship team. Mr Adynski has attended weekly lab meetings with Dr. Santos and Gilmore throughout his second year of the PhD and will have more opportunities to expand his training with other mentors as outlined in the training plan. His work with Dr. Santos to date has involved assisting a quantitative manuscript which explored the associations between psychological distress, social factors (e.g., discrimination, economic hardship) and DNA methylation of stress-related genes. Mr Adynski developed a manuscript from his NURS 972 Statistical Models for Health Research using the National Health and Nutrition Examination Survey, a nationally representative data set from the Center for Disease Control and Prevention exploring food security, food benefit participation, and depressive symptoms. Additionally, he participated in a scoping review on minimally invasive biological indicators assisting in the screening and extraction process. This paper uniquely contributed to the science by providing nurses a practical guide towards utilizing possible biological indicators identified by the National Institute of Nursing Research as common data elements. In addition to research development opportunities, Mr. Adynski continues to work clinically as a registered nurse and found opportunities to further develop his research skills by becoming involved in the Nursing Research Council at UNC Hospitals. Here he is the representative for the psychiatric service line and an active reviewer of all research and quality improvement projects involving nurses. Also, he is an active reviewer in Research in Nursing & Health.

Training Plan. Through coursework and additional mentored research activities Mr. Adynski has set the

foundation for this F31 NRSA to acquire the necessary training and mentorship to develop into an independent nurse scientist. The following short-term training goals were developed:

1) Expand expertise in the effects of early life adversity on child development and emotional health regulation.

2) Develop methodological and analytic skills in longitudinal approaches.

3) Acquire knowledge in evidence-based nursing intervention development and clinical translation

4) Expand career development and team science skills.

Tables 1-6 (Applicant's Background and Goals for Fellowship Training Section B: Training Goals and Objectives) outline the short-term goals and activities that support meeting the proposed training goals and objectives**.** These activities fall into the following general categories: content development, hands on training, and other activities, and are linked to measurable, anticipated outcomes that move the applicant in the direction of becoming an independent nurse scientist and launching a program of research. Mr. Adynski will take additional courses in child development, longitudinal data analysis, and intervention development in order to carry outlined training goals and successfully complete the proposed study. These experiences will support his understanding of his scientific areas of interest, working on interdisciplinary funded research studies, and meeting his short-term research goals to provide a solid foundation for his next career steps, in the form of a post-doctoral fellowship, to launch his career as an independent nurse scientist.

D. Number of Fellows/Trainees to be Supervised During the Fellowship

D1. Dr. Hudson Santos. During the time of this award Dr. Santos is responsible for supervising/training three PhD students as a dissertation chair and three students on their dissertation committee within nursing and Public Health program. Additionally, he is responsible for one post-doctoral fellow.

D2. Dr. Cathi Propper. During the time of this award Dr. Propper is responsible for supervising/training 5 PhD students within the Developmental Psychology Program. Also, she is responsible for 2 postdoctoral fellows.

E. Applicant's Qualifications and Potential for a Research Career

E.1. Dr. Hudson Santos Sponsor Statement

I am an Assistant Professor (currently awaiting promotion for Associate Professor with Tenure), Director of the Biobehavioral Laboratory Core at UNC at Chapel Hill School of Nursing, and Director of Training & Mentorship Division for the Institute for Environmental Health Solutions, UNC Gillings School of Global Public Health. I am an expert in socioenvironmental factors, early life stressors, and genomics related to child neurodevelopment in at-risk populations.

I met Harry Adynski in 2016 when he was an undergraduate student applying for the Hillman Scholar's Program, a highly competitive pre-licensure BSN to PhD Program. Upon Harry's acceptance into the Hillman Scholar's Program, I became his primary mentor and guided him to complete his undergraduate honors thesis, a rigorous secondary data analysis using the Child Community Health Network dataset from NICHD, which is now published in *Nursing Research & Health*. I also was his instructor for NURS671 a graduate level research methodology course, which he took as an undergraduate student. Inside the classroom Harry exhibited exemplary writing skills and an inquisitive nature.

Harry brings a strong background with a dual degree and Bachelor of Science in Psychology and Nursing and previous Research Assistant experience. His perseverance and commitment to research has been evident since his undergraduate studies. Upon entering the PhD Program, I continued to be impressed by his strong background and analytical skills, which provides a strong foundation for his future development into an independent nurse scientist. As he transitioned into the PhD program, I became his academic advisor, dissertation chair, and co-sponsor for this F31 application. I was impressed with Harry's ability to maintain his rigorous coursework and clinical practice in addition to producing high quality research. During his first year of the PhD he accepted the Hillman Scholars Clinical Fellowship, where he worked as a registered nurse at UNC-Medical Center. During this time Harry worked 40 hours a week clinically and took above and beyond the required fellowship PhD coursework to further his training. At times when I thought he may not follow through with such a heavy workload, again Harry impressed me by successfully completing all his coursework with A or High Pass grades, and moving manuscripts towards publications. Harry also exhibits strong networking skills. During his clinical fellowship he met Dr. John Gilmore (dissertation committee member) and took initiative to become involved in his research lab. As an emerging nurse researcher, he has been highly productive during his studies to date. He has published his honors thesis and then developed a second first author manuscript based upon the results from the thesis, which has been accepted and is currently in press. I have integrated him into my own research studies, where he assisted to write a manuscript as a second author which explored the associations

between psychological distress, social factors (e.g., discrimination, economic hardship) and DNA methylation of stress-related genes, which is currently under review. Additionally, he has assisted a peer to publish a scoping review on non-invasive biological indicators. I have witnessed his growth and emerging research interests across my time mentoring him. As a result of his productivity he has also been invited to be a reviewer on a nursing journal. I continue to be impressed with Harry's tenacity and have no doubt that he will continue to maintain this level of productivity during the remainder of his PhD studies.

Harry's interest, dissertation study and F31 award is a natural fit with my background and research. Harry's research interest has developed into exploring the role of social adversity on early child development, health, and well-being among vulnerable populations. I am well suited to serve as the co-sponsor for Harry's F31 proposal based upon my NIH funding (R01NR019245, R03HD101413, and K23NR017898). These studies focus on developmental outcomes among extremely preterm children, and related socioenvironmental factors and genetic and epigenetics mechanisms. I am a Co-Investigator in the Extremely Low Gestational Age Newborns (ELGAN) cohort study, which is part of the Environmental influences of Child Health Outcomes (ECHO) Consortium (UH3OD023348). My work has focused on innovative longitudinal methodology to explore and allow for risk stratification allowing for the development and or optimization of early risk mitigating interventions to improve quality of life for children. I have a track record of research and publication well suited for the proposed study and training with the needed expertise in social adversity and longitudinal methodology. I have been able to integrate Harry into my own research program throughout his PhD studies. Through my connections with the Frank Porter Graham Child Development Institute I connected him with his Co-Sponsor Dr. Cathi Propper. Together we have provided mentorship and support to Harry to write the proposed study and accompanying training plan. Dr. Propper and I have a strong history of collaboration.

Harry is the ideal type of candidate for a F31 award, he has the skills and motivation needed to move him towards a successful research-oriented career. I have witnessed his research interests develop over the time of my mentorship. The project that Harry proposes, and the associated training plan is feasible, significant, and innovative. Through my mentorship and extensive research network available at UNC I have provided opportunities for him to further refine his research interests and develop a strong multi-disciplinary mentorship team. I am confident that he is well suited to develop an independent research program given the continued support and training outlined within this F31 proposal.

E.2. Dr. Cathi Propper Sponsor Statement

I have known Mr. Adynski since Fall of 2019 when he met with me to discuss mentorship surrounding this F31 application and support and access to the Durham Child Health and Development Study (Durham Study). At our first meeting Mr. Adynski, Dr. Santos (co-sponsor) and I engaged in thoughtful conversation regarding the role of social adversity in emerging emotional health regulation during early childhood. It was evident that Mr. Adynski's immerging research interests align with my own and I saw potential for his growth into an independent scientist based upon his research productivity to date. Mr. Adynski brings a strong background with a dual undergraduate degree in Nursing and Psychology, which will serve him well to build further knowledge and expertise in child development and long-term health and wellbeing. At that time, I agreed to serve as the cosponsor for this F31 application and to serve on his dissertation committee. I am a strong fit as his co-sponsor and mentor because I have extensive experience and expertise in studying the development of infant and child behavior, cognition, emotion regulation, and sleep both individually and within the parent-child relationship. I have been actively involved in the formulation of this proposal and accompanying training plan. Dr. Santos and I have extensive experience collaborating together. I am the PI of the Human Development and Interdisciplinary Research Training (5T32HD0073676-30) where Dr. Santos is also actively involved. I am well suited to assist Mr. Adynski in completing this proposal and training plan. I am the Director and owner of the Durham Study, the data source for the proposed study. I will assist Mr. Adynski with access and support to conduct longitudinal and trajectory analyses of the data and interpret the key emotional health regulation observational behavioral tasks. Additionally, I have suggested coursework and hands on research experiences as a part of his training plan to develop his expertise in the effects of early life adversity on child development and emotional health regulation. Although the Durham Study is completed, I am the PI of The Brain and Early Experience (BEE) Study which is actively funded by the NICHD that examines links between early adversity (poverty) and child brain, cognitive, social-emotional, and health outcomes (5R01HD091148-03). I will integrate him into my active and ongoing (BEE) study to further his knowledge and development. Furthermore, I am committed to Mr. Adynski's training and will meet with him biweekly to support his development into an independent scientist.

November 16, 2020

National Institutes of Health
Center for Scientific Review
6701 Rockledge Drive MSC 7768
Bethesda MD 20892-7768
RE: Harry Adynski
eRA Commons Username: HARRY_ADYNSKI
FOA Number: PA-21-051

Dear Reviewers:

It is with great enthusiasm that I support the National Research Service Award (F31) application of Harry Adynski RN, BSN. I am a Distinguished Professor & Associate Dean of the PhD Program and Division at the University of North Carolina at Chapel Hill School of Nursing. I had the pleasure of knowing Mr. Adynski for the past three years as his professor in a PhD course, Writing Research Grants, and as a member of his dissertation committee.

I met Mr. Adynski during his undergraduate studies when he was interested in applying to the Hillman Scholars Program in Nursing Innovation. I immediately saw his potential to become an independent researcher through his previous research and training background and dual undergraduate degree in Nursing and Psychology. A strong student, Mr. Adynski has an unusual combination of abstract conceptualization and pragmatic application that have led to some of the most innovative and novel ideas I have seen in a PhD student. I have had an extensive history of collaboration with his sponsor and dissertation chair, Dr. Hudson Santos, and have witnessed Mr. Adynski's growth under his mentorship. Mr. Adynski received highest honors for his rigorous undergraduate honors thesis using secondary data from the NICHD Child Community Health Network. In this project, he explored social determinants of health and biological predictors of psychological distress in low income mothers across the first year postpartum.

Mr. Adynski took my grant writing course, a fast-paced rigorous course during which I was able to help him develop this F31 Proposal and join his dissertation committee. He has demonstrated the motivation, persistence, work ethic and intellectual strength required to excel in our program. In addition to working on Dr. Santos' NIH-funded studies, Mr. Adynski has produced two first-authored manuscripts, served as a key asset to one of my previous F31 funded PhD students' scoping review of the literature on non-invasive measurements of biomarkers related to chronic stress, and is part of a team writing a systematic review of maternal-child home-visiting programs. I have continued to be impressed by his ability to collaborate with peers and mentors, his capacity to navigate multidisciplinary teams while excelling in his coursework and production of quality research.

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nursing.unc.edu

I am ideally suited to mentor Mr. Adynski based upon his research interests in early life social adversity and its impact on child emotional health and wellbeing. His well-planned training plan includes developing knowledge and expertise in intervention development. His proposal will make a significant step toward identification of modifiable factors that mediate the relationship between social adversity and dysregulated emotions and behaviors in early childhood. By clarifying the association of social adversity, child emotional health regulation and academic performance, and the mediating effect of maternal executive function and parenting sensitivity on child emotional health regulation, Mr. Adynski will establish essential pathways toward interventions to change these drivers.

I am well suited and committed to overseeing Mr. Adynski's training in intervention development based my extensive experience constructing theory-driven interventions and embedding them in trusted community-serving entities that reach high-risk mothers and families. I currently am conducting a large hybrid RCT/implementation study within a national high-risk mother child prevention program. Mr. Adynski will have access to the ongoing work in that study as we test and refine an intervention designed to mitigate the impact of hardship and chronic stressors on mothering behaviors. I will also provide opportunities for Mr. Adynski to collaborate on the scholarly dissemination activities in our current work. Throughout the development of this proposal I have assisted in the development of his training plan proposing coursework and research experiences to meet his goals.

Mr. Adynski exhibits the traits of a promising emerging nurse scientist. I believe that Mr. Adynski's experiences, tenacity, and collaborative skills enhance his potential as a researcher making him an ideal candidate for an NRSA. The training plan Mr. Adynski outlined is feasible and will enable him to reach his short and long-term goals towards becoming an independent nurse researcher.

Sincerely,

Linda S. Beeber, PhD, PMHCNS-BC, FAAN
Frances Hill Fox Distinguished Term Professor
Associate Dean, PhD Program and Division

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UNC SCHOOL OF MEDICINE
Psychiatry

JOHN H. GILMORE, MD
Thad & Alice Eure Distinguished Professor
Vice Chair for Research and Scientific Affairs
Director, UNC Center for Excellence in
Community Mental Health

November 18, 2020

National Institutes of Health
Center for Scientific Review
6701 Rockledge Drive MSC 7768
Bethesda MD 20892-7768

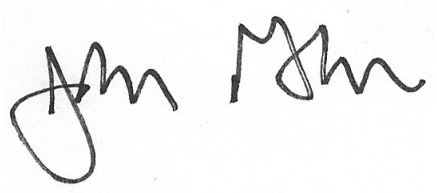
Dear Reviewers,

I am writing in enthusiastic support of Harry Adynski's application for this F31 award. I am the Thad and Alice Eure Distinguished Professor of Psychiatry and run the UNC Early Brain Development Study within UNC School of Medicine. I met Mr. Adynski as an attending physician at UNC-Medical Center where he continues to work as a clinical nurse on the adult inpatient psychotic disorder's unit. Although Mr. Adynski was a new graduate nurse at the time, I witnessed his compassion for patients in the clinical setting for individuals with severe mental illness, inquisitive nature, and strong interest in research. Mr. Adynski reached out to me seeking mentorship while expressing his interest in early risk factors for child emotional health dysregulation in vulnerable populations. At this time, I agreed to mentor him and serve on his dissertation committee. Mr. Adynski has been able to balance a difficult course load and clinical practice while also developing quality research; making him an ideal candidate for the F31 award.

Based on my own work I am well suited to support Mr. Adynski in developing expertise in early child development and longitudinal trajectories. My research focuses on understanding how early childhood brain development contributes to risk for schizophrenia and other psychiatric disorders. I use structural and functional imaging to study early childhood developmental trajectories and their relationship to cognitive and behavioral development in typically developing children, in twins, and in children at high risk for psychiatric disorders.

Mr. Adynski will have access to the ongoing work in the Early Brain Development Study throughout his training and has been integrated into my research team meetings. I will also provide mentorship throughout Mr. Adynski's training to provide opportunities for him to collaborate within my research group to develop scholarly activities in our ongoing work. I have provided support and mentorship developing this proposal and training plan and believe that it is feasible. I am confident that with the proposed training and strong multidisciplinary mentorship team that Mr. Adynski will be able to develop the knowledge and expertise to complete the proposed project, produce high quality research, and take the next steps in becoming a successful independent researcher.

Sincerely,



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JIANWEN CAI, PhD
INTERIM CO-CHAIR

LISA M. LAVANGE, PhD
INTERIM CO-CHAIR

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November 16, 2020

National Institutes of Health
Center for Scientific Review
6701 Rockledge Drive MSC 7768
Bethesda MD 20892-7768

Letter of Support for Harry Adnski's F31 Proposal

It is with pleasure that I write to support Harry Adynski's application for this F31 grant. I was impressed with Harry upon meeting him with his previous experience in managing secondary data and conducting longitudinal analyses and see a strong potential towards becoming an independent nurse scientist. I have met with Harry to talk about his proposed trajectory, regression, and mediation analyses as part of his research proposal, and I have reviewed multiple drafts of his proposal. I have assisted Harry to develop an appropriate analysis plan to answer his research aims focusing on emotional health regulation across early life. I have a specific training and expertise in the statistical modeling for big EHR data, repeated measurement data, longitudinal clinical study data, such as semi-parametric and non-parametric modeling for data from both observational and longitudinal clinical studies making me an ideal mentor to assist Harry within this proposal.

As part of my commitment to being on Harry Adynski's dissertation committee serving as a biostatistician and in support of his proposed project, I look forward to working with him to help him develop his expertise in longitudinal methods, regression analysis, and mediation analysis. I will assist him through hands-on interactions with his data and am committed to meeting with him biweekly during the analysis phase of his training plan. Harry is a strong candidate for the F31 award and has created a feasible training plan with an accompanying multidisciplinary team to foster his development into an independent nurse scientist.

Sincerely yours,

Baiming Zou, PhD
Assistant Professor
Department of Biostatistics
The University of North Carolina at Chapel Hill

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Dear Reviewers,

I am pleased to write this letter of support for Mr. Harry Adynski BSN, RN. I serve as Mr. Adynski's co-sponsor and have been actively involved in the development of this F31 application and am highly committed to his training. As the Director of the Durham Child Health and Development Study (DCHD Study) for 12 years I will provide essential support for Mr. Adynski in conducting the proposed secondary data analyses using the DCHD Study. This proposal will build upon the parent DCHD study by exploring the role of social adversity on emerging emotional health regulation trajectories across early childhood. As a developmental scientist I am well suited to support him through the outlined training plan and I am committed to assist him through data access, analysis, and interpretation of the DCHD Study.

Sincerely,

Cathi Propper, Ph.D.
Advanced Research Scientist
Director, Carolina Consortium on Human Development
Frank Porter Graham Child Development Institute
University of North Carolina at Chapel Hill
100 E. Franklin Street, CB 8115
Chapel Hill, NC 27599
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919-843-2400

DESCRIPTION OF INSTITUTIONAL ENVIRONMENT AND COMMITMENT TO TRAINING

The School of Nursing (SON) in the University of North Carolina at Chapel Hill (UNC-CH) has a robust program of productive, well-funded researchers dedicated the professional development of PhD students. Mr. Adynski has been supported in his research training at the UNC-CH SON with the Hillman Scholar in Nursing Innovation Program, the James M. Johnston Graduate Nursing Scholarship, and the North Carolina Excellence Fellowship. Through his BSN and PhD coursework, Mr. Adynski's training has benefited from instruction from faculty with active programs of research concerning social adversity, child emotional health regulation, and advanced research methodologies training. At UNC-CH, Mr. Adynski can continue to receive the mentorship necessary for the successful execution of his training plan with guidance from UNC-CH faculty at the SON (Drs. Santos, Beeber and Zou), School of Medicine (Dr. Gilmore), and Psychology Department (Dr. Propper). The UNC-CH SON and larger UNC-CH has the resources available to Mr. Adynski to achieve his Specific Aims and progress towards his goal of becoming an independent researcher. The SON has fostered student success by offering PhD students access to physical facilities, office space for pre-doctoral trainees, the Office of Research Support and Consultation, Biobehavioral Lab and the Office of Information and Instructional Technologies. In the larger UNC-CH community, Mr. Adynski's research training and intellectual development is also supported by the, UNC-CH libraries, the University Research Support Offices (including the Office of Human Research Ethics, Office of Sponsored Research, and Office of Clinical Trials), the North Carolina Translational and Clinical Sciences Institution (NC TraCS), the Odum Institute for Research in Social Science, discipline-based resources (including coursework, journal clubs, seminars, School of Medicine, UNC-CH Gillings School of Global Public Health, Psychology and Neuroscience Department, Center for Developmental science, Carolina Consortium on Human Development, and the Frank Porter Graham Child Development Institute). Mr. Adynski's utilization of these resources are described fully in the Facilities and Others Resources and Activities Planned under Award.

ADDITIONAL EDUCATIONAL INFORMATION

Harry Adynski is enrolled in the Nursing PhD program at the University of North Carolina at Chapel Hill. All students in this program must complete a minimum of 50 course credits (comprised of required courses, electives, independent studies and research practicum), a written qualifying exam and a dissertation with both an oral proposal defense and a final oral dissertation defense prior to degree completion. Required coursework includes 16 core knowledge and competency credits, 16 core methods course credits, 9 substantive area, methods support, or research practicum credits, 6 interdisciplinary credits outside of the school of nursing, and at least 6 dissertation credits. All coursework is designed to be completed within 2-3 years and must be passed with a grade of 70% or above. Following completion of 5 of the required core courses (NURS 912: Theoretical Foundations of Scientific Inquiry, NURS 959 Grant Writing; NURS 962: Conducting Systematic Reviews and Writing Specific Aims, NURS 972: Statistical Models for Health Research, NURS 976: Issues in Sampling and Design and NURS 977: Qualitative Methods), students must complete the written Qualifying Exam. Also, by the end of a student's second semester, he or she is expected to work with his or his advisor to create a three-person advisory committee that will later be enlarged to be the student's five-person dissertation committee. Following successful completion of all coursework and the qualifying exam and the development of the five-person committee, students are eligible to complete the oral dissertation proposal defense. Upon matriculation into the program, all PhD students are assigned to and meet with a program advisor. This advisor mentors the student in their development as an independent researcher through individual meetings, completion of an Independent Development Plan, research team meetings, and completion of faculty and student research. During a student's first semester, the student develops a plan of study with the advisor to map out. goals and timelines for the student's time in the program. The student also meets with the advisor, and later the dissertation committee, at least once per semester to discuss course selections and development of research competencies. The student's advisor, advisory and dissertation committee, the director of the PhD program, and the Progression Review Committee then use these documents to monitor the student's progression through the program and completion of milestones at the end of each semester.

Harry Adynski has progressed through the PhD program on track. Through the Hillman Scholars Program in Nursing Innovation, he benefited from mentorship from his co-sponsor and dissertation chair Dr. Hudson Santos during his undergraduate studies. The Hillman Scholars Program is a highly selective accelerated BSN-PhD program. In Fall 2018 Mr. Adynski matriculated into the PhD program in a cohort of five Hillman Scholars.

Upon graduating and matriculating into the PhD Program he completed the Hillman Scholars Clinical Fellowship (NURS901 & 902 Clinical Scholars in Nursing Innovation I & II) where he worked full time as a registered nurse at UNC-Health Care in the Neuroscience Hospital adult inpatient psychiatric unit. This fellowship is designed to transition Hillman Scholars from the BSN to PhD phase of the program with a minimum of 600 hours of required clinical nursing practice alongside formal coursework focusing on integrating clinical and research practice competencies. During the fellowship year, Mr. Adysnki took additional coursework including an extra PhD Nursing Core course and a PhD elective (NURS976: Issues in Sampling and Design; NURS 962: Conducting Systematic Reviews and Writing Specific Aims; NURS972 Statistical Models for Health Research; PSYC 868: Seminar in Social Psychology "Social Psychobiology"). During his second year in the PhD, he completed the required PhD Nursing courses and one elective (NURS912: Theoretical Foundations of Scientific Inquiry; NURS 963: Writing for Publication; NURS 978 Principles of Measurement; NURS959 Research Grant Writing; NURS 977 Qualitative Approaches to Knowledge Development; NURS 968: Writing the Pre-Doctoral Training Plan for a Research-Intensive Career; HPM 830 Translational Health Disparities: Research, Practice, & Policy). Additionally, Mr. Adynski has completed two Independent Research Practicums with Dr. Santos designed to further his own independent research and collaborate in his NIH funded studies (NURS985: Research Seminar and Practicum). He passed his qualifying exam in May 2020 and is on track to complete the final elective coursework outlined in his training plan by Spring 2022. He has assembled his five-person committee, which includes Dr. Hudson Santos (co-sponsor), Dr. Cathi Propper (co-sponsor), Dr. Baiming Zou, who is serving as his bio-statistician and Dr. John Gilmore and Dr. Linda Beeber who are providing content expertise (collaborators). Harry Adynski will defend his dissertation proposal in Spring 2021, write a three-paper dissertation, and defend his dissertation in the Summer 2022. Over the past 10 years, time to degree for students who have graduated has averaged 5.5 years.

AUTHENTIFICATION OF KEY BIOLOGICAL AND/OR CHEMICAL RESOURCES

N/A

PHS Assignment Request Form

Funding Opportunity Number: PA-21-051

Funding Opportunity Title: Ruth L. Kirschstein National Research Service Award (NRSA) Individual Predoctoral Fellowship (Parent F31)

Awarding Component Assignment Request *(optional)*

If you have a suggestion for an awarding component (e.g., NIH Institute/Center) assignment, use the link below to identify the appropriate short abbreviation (e.g. "NCI" for National Cancer Institute") and enter it below in the boxes for "Suggested Awarding Components". All suggestions will be considered; however, not all assignment suggestions can be honored.

Awarding Components: https://grants.nih.gov/grants/phs_assignment_information.htm#AwardingComponents

Suggested Awarding Component: NINR

Study Section Assignment Request *(optional)*

If you have a suggestion for a study section assignment, use the link below to identify a study section(s). Enter the short abbreviation for that study section in the boxes for "Suggested Study Sections." Remove all hyphens, parentheses, and spaces. All suggestions will be considered; however, not all assignment suggestions can be honored.

For example, enter "CAMP" if you wish to suggest assignment to the NIH Cancer Molecular Pathobiology study section, or "ZRG1HDMR" if you wish to suggest assignment to the NIH Healthcare Delivery and Methodologies SBIR/STTR panel for informatics.

Study Sections: https://grants.nih.gov/grants/phs_assignment_information.htm#StudySection

Assign to Study Section:
Each entry is limited to 20 characters

PHS Assignment Request Form

Rationale for assignment suggestions ***(optional)***

Entry is limited to 1000 characters

List individuals who should not review your application and why ***(optional)***

Entry is limited to 1000 characters

Identify scientific areas of expertise needed to review your applications ***(optional)***

Note: Do not provide names of individuals

Expertise:
Each entry is limited to 40 characters

PHS Human Subjects and Clinical Trials Information

Use of Human Specimens and/or Data

* Does any of the proposed research involve human specimens and/or data?	●Yes	❍No
Provide an explanation of why the application does not involve human subjects research		
Are Human Subjects Involved	●Yes	❍No
Is the Project Exempt from Federal regulations?	●Yes	❍No

Exemption Number

❑ 1	❑ 2	❑ 3	■ 4	❑ 5	❑ 6	❑ 7	❑ 8

Other Requested Information

Human Subject Studies

Study#	Study Title	Clinical Trial?
1	The Role of Social Adversity on Trajectories of Child Emotional Health Regulation	No

Delayed Onset Studies

Delayed Onset Study#	Study Title	Anticipated Clinical Trial?	Justification
The form does not have any delayed onset studies			

Section 1 - Basic Information (Study 1)

1.1. * Study Title (each study title must be unique)

The Role of Social Adversity on Trajectories of Child Emotional Health Regulation

1.2. * Is this study exempt from Federal Regulations? ●Yes ❍No

1.3. Exemption Number

❑ 1	❑ 2	❑ 3	■ 4	❑ 5	❑ 6	❑ 7	❑ 8

1.4. * Clinical Trial Questionnaire

1.4.a. Does the study involve human participants?	●Yes	❍No
1.4.b. Are the participants prospectively assigned to an intervention?	❍Yes	●No
1.4.c. Is the study designed to evaluate the effect of the intervention on the participants?	❍Yes	●No
1.4.d. Is the effect that will be evaluated a health-related biomedical or behavioral outcome?	❍Yes	●No

1.5. Provide the ClinicalTrials.gov Identifier (e.g. NCT87654321) for this trial, if applicable

Section 2 - Study Population Characteristics

2.1. Conditions or Focus of Study
2.2. Eligibility Criteria

2.3. Age Limits — Min Age: — Max Age:

2.3.a Inclusion of Individuals Across the Lifespan — Adynski_InclusionLifespan1046480229.pdf

2.4. Inclusion of Women and Minorities — Adynski_InclusionWomenMinorities1046480167.pdf

2.5. Recruitment and Retention Plan
2.6. Recruitment Status
2.7. Study Timeline
2.8. Enrollment of First Participant

Inclusion Enrollment Reports

Entry#	Enrollment Location Type	Enrollment Location
IER 1	Domestic	

Section 3 - Protection and Monitoring Plans

3.1. Protection of Human Subjects — Adynski_ProtectionHumanSubjects1046480168.pdf

3.2. Is this a multi-site study that will use the same protocol to conduct non-exempt human subjects research at more than one domestic site? ❍ Yes ● No ❍ N/A

If yes, describe the single IRB plan

3.3. Data and Safety Monitoring Plan — Adynski_DataSafetyMonitoring1046480169.pdf

3.4. Will a Data and Safety Monitoring Board be appointed for this study? ❍ Yes ❍ No

3.5. Overall Structure of the Study Team

Section 4 - Protocol Synopsis

4.1. Study Design
4.1.a Detailed Description
4.1.b. Primary Purpose
4.1.c. Interventions

Type	Name	Description

4.1.d. Study Phase
Is this an NIH-defined Phase III Clinical Trial? ❍ Yes ❍ No

4.1.e. Intervention Model
4.1.f. Masking ❍ Yes ❍ No

❏ Participant ❏ Care Provider ❏ Investigator ❏ Outcomes Assessor

4.1.g. Allocation

4.2. Outcome Measures

Type	Name	Time Frame	Brief Description

4.3. Statistical Design and Power

4.4. Subject Participation Duration

4.5. Will the study use an FDA-regulated intervention? ❍ Yes ❍ No

4.5.a. If yes, describe the availability of Investigational Product (IP) and Investigational New Drug (IND)/Investigational Device Exemption (IDE) status

4.6 Is this an applicable clinical trial under FDAAA? ❍ Yes ❍ No

4.7. Dissemination Plan

Section 5 - Other Clinical Trial-related Attachments

5.1. Other Clinical Trial-related Attachments

Inclusion Enrollment Report 1

1. * Inclusion Enrollment Report Title: The Role of Social Adversity on Trajectories of Child Emotional Health Regulation

2. * Using an Existing Dataset or Resource: ●Yes ❍No

3. * Enrollment Location Type: ●Domestic ❍Foreign

4. Enrollment Country(ies): USA: UNITED STATES

5. Enrollment Location(s):

6. Comments:

Planned

Racial Categories	Ethnic Categories				
	Not Hispanic or Latino		Hispanic or Latino		Total
	Female	Male	Female	Male	
American Indian/Alaska Native	0	0	0	0	0
Asian	0	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0	0
Black or African American	0	0	0	0	0
White	0	0	0	0	0
More than One Race	0	0	0	0	0
Total	0	0	0	0	0

Cumulative (Actual)

Racial Categories	Ethnic Categories									
	Not Hispanic or Latino			Hispanic or Latino			Unknown/Not Reported Ethnicity			Total
	Female	Male	Unknown/ Not Re-ported	Female	Male	Unknown/ Not Re-ported	Female	Male	Unknown/ Not Re-ported	
American Indian/Alaska Native	0	0	0	0	0	0	0	0	0	0
Asian	0	0	0	0	0	0	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0	0	0	0	0	0	0
Black or African American	50	48	0	0	0	0	0	0	0	98
White	39	38	0	0	0	0	0	0	0	77
More than One Race	0	0	0	0	0	0	0	0	0	0
Unknown or Not Reported	0	0	0	0	0	0	0	0	0	0
Total	89	86	0	0	0	0	0	0	0	175

INCLUSION ACROSS THE LIFESPAN

This proposed study will use secondary data from the Durham Child Health and Development Study (Durham Study). All participants in the parent study were mother-child dyads, and therefore the child portion of all dyads were below 18 years of age meeting the definition of children. Inclusion criteria for the parent study were full-term infants born without significant birth complications. A total of 206 infants and families were recruited at baseline which occurred at 3 months (child-age). At the 36-month follow-up, 175 children completed data collection. Data collection was finished when children are in 2nd grade and approximately 7-8 years old. This proposal will use the child data to address our primary aims including the role of social adversity on emerging child emotional health regulation trajectories and accompanying academic performance. This dataset was selected in order to better understand how social adversity impacts emerging emotional health regulation trajectories in early childhood and therefore, older adults were not included. This proposal stands to inform interventions that can reduce the burden of social adversity on emerging emotional health regulation and its long-term implications on health and wellbeing, therefore inclusion of children subjects is critical to this study.

The dataset will include a sufficient number of children to contribute to the multiple regression analyses necessary to complete the study aims. The research team for the parent study has strong expertise for working with the children included in the studies. The Durham Study teams were led by Dr. Propper (PI; co-sponsor) who will be able to provide the expertise to working with this population. In addition to Dr. Propper, my mentorship team has extensive experience working with child populations (Drs. Santos, Gilmore, Beeber).

INCLUSION OF WOMEN AND MINORITIES

This proposed study will use secondary data from the Durham Child Health and Development Study (Durham Study). All families from the original cohort were recruited from Durham, North Carolina, a medium-sized city with a majority non-white population, in the southern United States in 2002. The Durham Study aimed to explore early child development and physiologic regulation in mother-child dyads through multiple in-home, laboratory, and school visits spanning across infancy and into early childhood. The initial visit was conducted at three months, with final follow up visits completed at 2nd grade. The study took place in an urban community. For the purpose of this proposal mother data will be used to conduct the proposed analyses in aim 3 to explore the potential mediating roles of maternal characteristics including executive functioning and parenting sensitivity. The adult portion of this sample is entirely cis women.

The parent study enrolled a socioeconomically and racially diverse sample. The sample comprises approximately equal numbers of African American (52%) and European American (48%) families from lower (48% = < 200% federal poverty line (FPL)) and higher-income groups (>200% FPL). These demographics were chosen to make direct comparison between equal groups of racial and income in order to make comparisons between economic and racial groups. In 2000, when the parent study data collection began, the Latinx population in Durham County was 7.6% and was therefore not recruited in order to make statistically meaningful group comparisons (84). For the purpose of this proposal, we will use all mother-child dyads with complete data from the three months to 1st grade follow up visit.

PROTECTION OF HUMAN SUBJECT'S

The proposed study includes a secondary data analysis of de-identified data from the Durham Child Health and Development Study (Durham Study). As part of this proposal, **we will use data *already* collected from the Durham Study.** The study was previously approved through the IRB and maintained continuous data and safety monitoring procedures throughout the study and all data were stripped of any identifiers that could be used to link data to participants. The Durham Study still maintains IRB approval for the analysis of data. Dr. Propper (co-sponsor) was the PI of the study. Mr. Adynski will apply to the University of North Carolina at Chapel Hill's IRB to receive approval for the proposed secondary data analysis.

Human Subjects Involvement, Characteristics, and Design

The secondary analysis will not include any interactions or interventions with the original sample from the parent study, which has previously received approval in **Protection of Human Subjects (IRB# 07-1075)** and is closed for recruitment. **Since Mr. Adynski will not be interacting with the original participants from the parent study and all data will be de-identified, this proposal describes the protection of human subject procedures from the parent study. For this F31 award, I will submit a secondary data analysis application to the UNC IRB**.

The completed parent study is a longitudinal cohort study which explored early child development and physiologic regulation in mother-child dyads through multiple in-home, laboratory, and school visits spanning across infancy into early childhood. The initial visit was conducted at three months, with final follow up visits completed at 2nd grade. The study took place in an urban community setting. All families from the original cohort were recruited from Durham County, North Carolina, a medium-sized city with a majority non-white population, in the southern United States. The parent study enrolled a socioeconomically and racially diverse sample, essential for this training proposal. The sample comprises approximately equal numbers of African American (52%) and European American (48%) families from lower (48% = < 200% federal poverty line (FPL)) and higher-income groups (>200% FPL for the data collection year). Data were collected across 3, 6,12, 24, and 36 months in the first wave of data collection and at kindergarten, 1st grade, and 2nd grade during the second wave of data collection. Both parental consent and child assent were obtained when collecting the original data. For the purpose of this proposal we will use child, mother, and teacher report data from the first and second wave of data collection to explore our study aims. Please note that the use of physiological data is not a part of the planned F31 study.

Data and Safety Monitoring Plan

All data are currently stored on an encrypted database protected by UNC firewall. Upon receiving IRB approval, Dr. Propper will provide access to the de-identified data from the Durham Study to assure that the trainee does not and will not gain access to any identifiable data. The dataset for the proposed secondary analysis will be stored on an encrypted server within the University of North Carolina at Chapel Hill School of Nursing. Dr. Propper will provide supervision of the trainee throughout the time that the data are being used and will serve as the IRB liaison.

Potential Risks and Protection Against Risks

Loss of confidentiality: By nature of being in the study, there is a potential risk of loss of confidentiality to the participants. In order to provide protection against the risk of *loss of confidentiality* Dr. Propper will grant access to de-identified data stripped of any identifiers that could be used to link data to participants and Mr. Adynski will create new subject identifiers in order to maintain data security.

Importance of the Knowledge to be Gained

The proposed F31 study provides critical information on the impact of social adversity on emotional regulation trajectories and resulting school performance outcomes. The proposed secondary analysis data from the Durham Study provides critical information on the early life risk factors and mechanisms for emotional dysregulation among an economically and socioeconomically diverse sample, (i.e. equal number of African American and European American groups and High and Low Income). Estimates indicate that as many as 26% of children experience emotional problems and these effects are particularly salient among vulnerable children who experience social adversity. We will explore modifiable maternal characteristics as mediators between social adversity, emotional health regulation trajectories, and academic performance. If mediation is established, this can inform child-parent interventions aimed to reduce the effects of social adversity to promote emotional regulation and related academic performance. The promotion of emotional regulation and academic performance will have implications on health and wellbeing. The minimal risks are of loss of confidentiality have been considered and reasonable given the potential magnitude of information that will be gained.

DATA SAFETY MONITORING PLAN

The parent study entitled The Durham Child Health and Development Study (Durham Study) is approved by the UNC-CH IRB, which oversees data safety monitoring. Data from the Durham Study are currently stored on the University of North Carolina, Chapel Hill secure network. Data is be maintained on a secure network, deidentified of participant identifiers, and cleaned to contain only the variables of interest to my study. To promote this study's reproducibility, the code developed for data analysis of each aim will be saved to allow for future validation and verification by others. In cases of data sharing or data requests, both the original PI of the Durham Study, Dr. Cathi Propper, and the Institutional Review Board (IRB) will be consulted in order to protect the rights and privacy of the participants in the parent study. In the event of any problems, the co-sponsor, the IRB, and Dr. Cathi Proper at will be notified immediately through email and telephone communication. Should any issues arise with the survey study, both the co-sponsor and IRB will be notified immediately.