



How To Design a Grant Budget and Justification *for Mailman School Researchers*

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Sponsored by the Research Resources (R²) Office

+ Our Agenda

1. Determining your project's funding needs
2. Review selection of different budget templates
3. Analyze selection of different budget justifications
4. Review internally required confirmations and documents
 1. Salary confirmations and RASCAL approvals
 2. In-kind support and corresponding approvals
 3. Conflict of interest disclosure and RASCAL certifications
5. Review funder-required confirmations and documents
 1. Consultant letters of support
 2. Subcontract agreements
 3. Letters of support for service agreements

+ Determining your project's general funding needs

Draft your study aims, a general scope of work, and outline your proposed study activities. As you do this, consider the following questions:

Who is needed to accomplish what you've proposed?

- How much of your time (effort) will be required to accomplish what you've proposed?
- Who else will need to be involved? How much of their time (effort) will be required?
- Will you need to partner with another organization/ an individual from another organization? What will this partnership entail? How long will it last?

How long (in years) is needed to accomplish what you've proposed?

What is needed to accomplish what you've proposed?

- What are the major costs associated with the activities you've outlined (Data collection? Travel? Participant incentives? Equipment? Use of facilities, such as laboratories?)

+ Developing your Personnel Budget

- Determine who you want on your study team each individual's effort
 - Identify **specific individuals** for each position, rather than using "TBD" placeholders.
 - Confirm that these individuals agree to work on the grant before circulating their names.
- Contact your DA/ grants administrator as soon as possible with this information.
- Your DA/ grants administrator will:
 - Verify salary information from collaborators' departments.
 - Be aware of any agency salary caps (e.g., \$181,500 for NIH and other PHS agencies) and how to deal with these.
 - Calculate personnel costs **annually** and over the **entire budget period**.
 - Provide you with personnel cost information.
- The remaining amount is available for either direct costs *or* direct + ICs (depending on your funding opportunity).
- NIAID suggests that salary should make up **60-80%** of your budget.
- For most PHS grants, you will need to collect **Biographical Sketches** for all individuals listed as Key Personnel on your budget.

+ Developing your Personnel Budget

Your DA/ grants administrator will use an excel spreadsheet like the one below to calculate personnel costs.

Modified Total Direct Costs (MTDC): salaries and wages, fringe, materials, supplies, services, travel, and subgrants/ subcontracts (up to \$25,000).

Total personnel costs for this 3-year project (inc. salary for both investigators and fringe) = \$217,793.

Use actual names rather than TBD placeholders.

Total Direct Costs:	48,470	43,178	44,473	Total Direct Costs:	136,121
MTDC:	48,470	43,178	44,473	MTDC:	136,121
Indirect Costs:	29,082	25,907	26,684	Indirect Costs:	81,672
Total Costs:	77,552	69,084	71,157	Total Costs:	217,793

Name	Role	Annual Effort (FTE %)					Year 1				Year 2				Year 3				
		Salary	Year 1	Year 2	Year 3	Year 4	Year 5	Base Salary	Salary	Fringe	Total	Base Salary	Salary	Fringe	Total	Base Salary	Salary	Fringe	Total
Dr. PI	PI	110,000	20%	20%	20%	0%	0%	110,000	22,000	6,820	28,820	113,300	22,660	7,025	29,685	116,699	23,340	7,235	30,575
Dr. Co-I	Co-I	100,000	15%	10%	10%	0%	0%	100,000	15,000	4,650	19,650	103,000	10,300	3,193	13,493	106,090	10,609	3,289	13,898
Subtotals (Personnel - S&F)								37,000	11,470	48,470		32,960	10,218	43,178		33,949	10,524	44,473	

Dr. PI	89,080
Dr. Co-I	47,041
Total	136,121

Explain changes in % effort in budget justification.

This is a 3-year project.

Fringe is applied at a rate of 31.7% (8.15% for student salaries) for govt grants; 33.7% (8.86% for students salaries) for non-govt grants.

A 3% cost of living increase is applied per year.

Indirect costs are applied at a rate of 60% for on-campus research and 26% for off-campus research, unless funding agency policies differ. Please refer to CU negotiated F&A agreement for other rates.

+ Determining Non-Personnel Costs

Most PHS agencies separate non-personnel costs into the following categories:

1. **Equipment:** Property that costs \$5,000+ and has an expected life of over 1 year
 2. **Travel:** Domestic (U.S., Canada, Mexico & U.S. possessions)/ Foreign
 3. **Participant/Trainee Support Costs:**
 - NIH: unless otherwise noted, this will be kept blank; tuition remission for graduate students will be included in Other Direct Costs.
 - NSF: used for transportation, per diem, stipends, and other costs for participants/trainees.
 4. **Other Direct Costs:**
 - Materials and supplies
 - Publication costs (NIH)/ Publication/Documentation/Dissemination (NSF)
 - Consultant services
 - ADP/Computer services (NIH)/ Computer costs (NSF)
 - Subawards/consortium/contractual costs (NIH)/ Subawards (NSF)
 - Equipment or facility rental/user fees (NIH)
 - Alterations and renovations (NIH)
 - "Other"
- Discuss your proposed non-personnel costs with your DA/ grants administrator to determine if:
 - Proposed costs are *allowable* by your funding agency.
 - Proposed costs should be considered *ICs* (not included as a direct cost budget line item).

+ Travel

- Domestic and International travel are generally allowable costs.
- If you cannot find explicit guidance about whether they are allowable under your funding mechanism, ask your DA/grants administrator. They may contact the funding agency.
- Budget for:
 - Travel required to complete the proposed project activities (e.g., to data collection sites)
 - Travel to scientific meetings to disseminate results in later year(s) of project period.
- Determining travel costs:
 - Your DA/grants administrator may have a standard dollar amount used for domestic and/or international trips.
 - If you are responsible for calculating travel costs:
 - Check professional association websites for information on where conferences will be held in future years.
 - Estimate travel and accommodation costs using a website like Expedia.com.
 - Don't forget to budget for ground transportation (e.g., to and from airport, to meeting or recruitment site from hotel).

+ Consultants

- If you have collaborators who: provide **advice or services**; *do not work at Columbia*; and will **not** be majorly contributing to your project, you will likely budget them as **consultants**.
- Consultants work for a fee. Usually, consultant fees are paid by the hour. For example, you would calculate costs for consultants as follows: 300 hours at \$50 an hour = \$15,000.
- You must include a signed letter from the consultant stating their willingness to participate, their role, and their level of compensation.

+ Sub-awards/ Consortium Agreements

- Discuss with your DA/ grants administrator or program officer to ensure that subawards are allowable costs by your funding agency.
- Use a subaward when your collaborating institution will be making **significant contributions to the design, conduct, or outcome of your project.**
- If you will include a subaward, you need to prepare the following with your grant application:
 - **Formal budget** from the subcontract institution
 - **Budget justification** for subaward
 - **Subcontract Proposal Face Page** (info about prime and subaward institutions, signed by both the PI of the subaward and authorized official at subaward institution)
 - **Scope of Work** for subaward institution, ICs should be included in the subaward; up to 8% for foreign institutions and a federally negotiated rate for domestic institutions.
 - Information about compliance with financial conflict of interest policies.
 - Biosketches from key personnel on subcontracts.
- The prime institution (Columbia) will receive ICs for the **first \$25,000 of the subaward** for government applications.

+ NIH Policy on Acceptance for Review of Unsolicited Applications that Request \$500,000 or more in Direct Costs in any year

- Applicants wishing to submit an application with **\$500,000+** in *direct costs in any one year* must reach out to Institute/Center program staff in writing at least **6 weeks** prior to the anticipated submission date of the application. You will include a draft of the proposed budget with the request. Your DA will help you with this process.
- If the Institute/Center is willing to accept the application for consideration, they will contact the Center for Scientific Review (CSR) before the application is submitted.
- The application must include a **cover letter** that identifies the program staff member and Institute/Center that has agreed to accept the application for consideration.
- Any application requesting \$500,000+ in direct costs in any one year that does not indicate that the PI has received approval from the Institute/Center will be *returned without review*.

+ Budget-related Forms for NIH/Other PHS Agencies

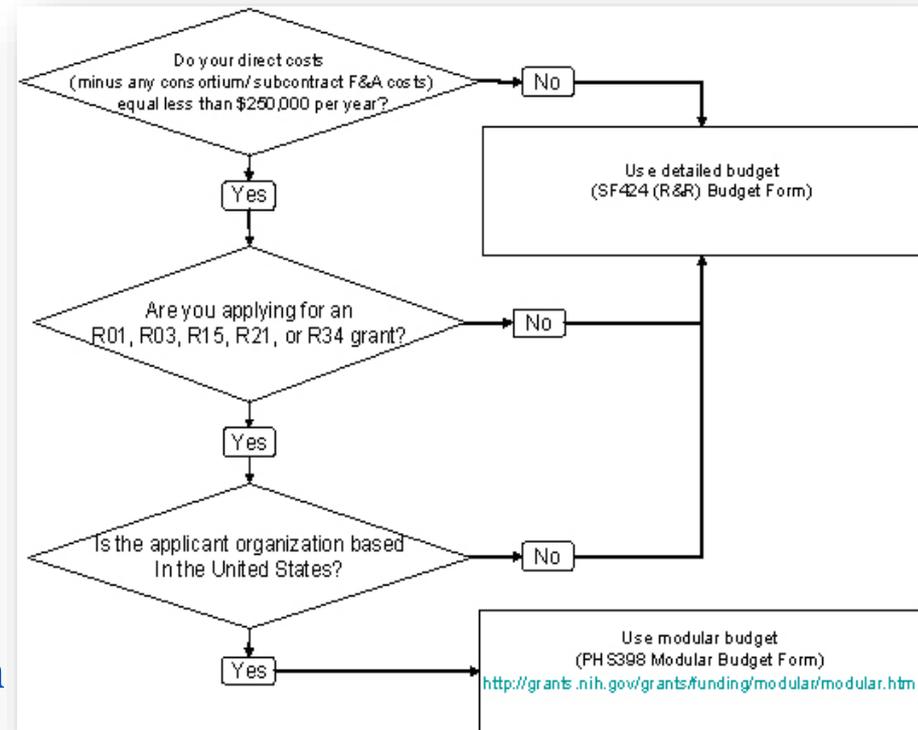
DOCUMENT	REQUIRED	OPTIONAL	INSTRUCTIONS IN SF424 R&R GUIDE
SF424 (R&R) Budget (Use when required or allowed by the FOA)	*		Section 4.7
SF424 (R&R) Subaward Budget Attachment Form (Use when required or allowed by the FOA)		X	Section 4.8
PHS 398 Modular Budget (Use when required or allowed by the FOA)	*		Section 5.4

- **For most NIH and other PHS grant applications there are 2 possible budget components:**
 - (1) [SF424 \(R&R\) Budget](#) *-or-*
 - (2) [PHS 398 Modular Budget](#).
- NIH application submissions must include *either* the SF424 (R&R) Budget Component or the PHS 398 Modular Budget Component, but *never both*. (AHRQ does not accept modular budgets.)
- ***Your DA/ grants administrator will determine which budget form is appropriate*** and transfer your budget from an excel spreadsheet to official forms.

+ Detailed vs. Modular Budget Forms

(for NIH/ PHS Agencies)

- SF424 (R&R) Budget Form (Detailed budget):
 - When **direct** project costs **exceed \$250,000/year**
 - All applications from **non-U.S.** institutions
- PHS 398 Modular Budget:
 - When **direct** project costs **total of \$250,000 or less, and**
 - One of the following mechanisms is used: R01; R03; R15; R21; (R34 (or some additional mechanisms, specified in RFA/PAs), *and*
 - The applicant organization is **based in the U.S.**
- ***Your DA/grants administrator will determine which form you will use.***



+ Detailed vs. Modular Budget Forms (for NIH/ PHS Agencies)

- According to NIAID, about 76% of new investigators and 66% of established investigators used a modular budget.
- For modular budgets, you will request direct costs in **modules of \$25,000**.
- Does **not** require a detailed breakdown of direct costs.
- Typically, you will request the **same number of modules** each year; explain in your budget justification if the number of modules vary from year to year.
- However, even when you will be submitting a modular budget to the funding agency, ***Columbia University requires a detailed (itemized) budget.***

+ Sample Budget: P01

Project #2: Neural Pathways Underlying Associations between SES and Cognitive Measures								
RFA: PAR 13-257								
Earliest anticipated start-date: 01/01/2015								
			YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	
	Base		01/01/15	01/01/16	01/01/17	01/01/18	01/01/19	
PERSONNEL	Salary	Effort	12/31/15	12/31/16	12/31/17	12/31/18	12/31/19	Total
Pam Factor-Litvak (Project Lead)								
Ezra Susser								
Xinhua Liu								
Ron Wapner								
Bradley Peterson								
Diane Levy								
Katrina Kezios								
TBN RA								
Ravi Bansal								
Zhishun Wang								
Dongrong Xu								
Ming Qian								
Yuankai Huo								
Total Salary			\$ 264,297	\$ 161,762	\$ 152,744	\$ 155,979	\$ 237,455	\$ 972,236
Fringe @30%			\$ 79,289	\$ 48,529	\$ 45,823	\$ 46,794	\$ 71,236	\$ 291,671
Total Salary & Fringe			\$ 343,586	\$ 210,291	\$ 198,567	\$ 202,772	\$ 308,691	\$ 1,263,907
OTPS								
Travel							\$ 5,000	\$ 5,000
Computer			\$ 1,705	\$ -	\$ -	\$ -		\$ 1,705
Supplies and software			\$ 2,043					\$ 2,043
DUA			\$ 10,000	\$ -	\$ -	\$ -	\$ -	\$ 10,000
MRI			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Patient Compensation			\$ -	\$ 12,000	\$ 18,000	\$ 18,000	\$ -	\$ 48,000
Patient Recruitments Costs			\$ -	\$ 4,800	\$ 7,200	\$ 7,200	\$ -	\$ 19,200
Meetings and occasions			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Biostats COSF (\$4,426 per FTE)			\$ 1,328	\$ 456	\$ 470	\$ 484	\$ 1,744	\$ 4,480
Fax/mail @ \$150/mo			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Phones @ \$150/mo			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal			\$ 15,076	\$ 17,256	\$ 25,670	\$ 25,684	\$ 6,744	\$ 90,428
Subcontract w/RFMH								
Direct			\$ 71,454	\$ 130,065	\$ 152,446	\$ 157,961	\$ 121,199	\$ 633,125
Indirect			\$ 42,729	\$ 77,779	\$ 91,163	\$ 94,461	\$ 72,477	\$ 378,609
TOTAL DIRECT			\$ 472,846	\$ 435,390	\$ 467,845	\$ 480,877	\$ 509,110	\$ 2,366,069
TOTAL DIRECT (LESS CONSORTIUM F&A)			\$ 430,116	\$ 357,612	\$ 376,683	\$ 386,417	\$ 436,633	\$ 1,987,461
MTDC			\$ 383,662	\$ 227,547	\$ 224,237	\$ 228,456	\$ 315,434	\$ 1,379,336
IC (60%)			\$ 230,197	\$ 136,528	\$ 134,542	\$ 137,073	\$ 189,261	\$ 827,601
TOTAL			\$ 703,043	\$ 571,918	\$ 602,387	\$ 617,951	\$ 698,371	\$ 3,193,671
			4,480	197	905	6,493	2,662	
			\$ 434,596	\$ 357,809	\$ 377,588	\$ 392,910	\$ 439,295	

+ Sample Budget: R01

Contact PI: Factor Litvak								
			YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	
			07/01/14	07/01/15	07/01/16	07/01/17	07/01/18	
PERSONNEL	Salary	Effort	06/30/15	06/30/16	06/30/17	06/30/18	06/30/19	Total
Pam Factor-Litvak								
Ezra Susser								
Ron Wapner								
Xinhua Liu								
Diana Levy								
Sudha Kashap								
Katrina Kezios								
Mirtha delValle								
TBN RA								
TBN Proj Coordinator								
TBN F/U Coordinator								
Total Salary			\$ 168,435	\$ 145,021	\$ 140,110	\$ 149,428	\$ 166,529	\$ 769,524
Fringe @30%			\$ 50,530	\$ 43,506	\$ 42,033	\$ 44,828	\$ 49,959	\$ 230,857
Total Salary & Fringe			\$ 218,965	\$ 188,528	\$ 182,143	\$ 194,257	\$ 216,488	\$ 1,000,381
OTPS								
Travel			\$ 1,500	\$ 1,500	\$ 1,500	\$ 1,500	\$ 1,500	\$ 7,500
Supplies			\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 1,500	\$ 11,500
Lab Supplies-Year 1 only				\$ 4,000				\$ 4,000
Sample Storage and Shipping			\$ 7,114	\$ 6,008	\$ 6,734	\$ 5,718	\$ 6,434	\$ 32,008
Assays:Perflouridate compounds	\$ 7,248			\$ 28,993	\$ 21,745	\$ 21,745		\$ 72,483
Assays:C Reactive Protein and IL-6	\$ 7,061			\$ 21,183	\$ 21,183	\$ 21,183	\$ 7,061	\$ 70,610
Patient Renumeration			\$ 17,300	\$ 15,900	\$ 16,400	\$ 15,100	\$ 15,600	\$ 80,300
COSF-Xinhua Liu+ Diane levy	\$ 4,426		\$ 1,107	\$ 903	\$ 691	\$ 939	\$ 958	\$ 4,598
RTI			\$ 10,000	\$ 10,000				\$ 20,000
Phones/Fax/Mail @ \$150/mo			\$ 1,800	\$ 1,836	\$ 1,873	\$ 1,910	\$ 1,948	\$ 9,367
Subtotal			\$ 41,321	\$ 92,823	\$ 72,625	\$ 70,595	\$ 35,002	\$ 312,366
Subcontract #1 UMDNJ								
Direct			\$ 170,075	\$ 172,955	\$ 175,893	\$ 178,889	\$ 181,946	\$ 879,758
Indirect			\$ 100,344	\$ 102,043	\$ 103,777	\$ 105,545	\$ 107,348	\$ 519,057
Subcontract #2 CCHS								
Direct			\$ 64,196	\$ 36,551	\$ 62,504	\$ 37,197	\$ 64,943	\$ 265,391
Indirect			\$ 36,207	\$ 20,615	\$ 35,252	\$ 20,979	\$ 36,628	\$ 149,681
TOTAL DIRECT			\$ 631,108	\$ 613,515	\$ 632,194	\$ 607,462	\$ 642,355	\$ 3,126,633
TOTAL DIRECT (LESS CONSORTIUM F&A)			\$ 494,557	\$ 490,857	\$ 493,165	\$ 480,938	\$ 498,379	\$ 2,457,895
MTDC			\$ 310,286	\$ 281,351	\$ 254,768	\$ 264,852	\$ 251,490	\$ 1,362,746
IC (60%)			\$ 186,172	\$ 168,810	\$ 152,861	\$ 158,911	\$ 150,894	\$ 817,648
TOTAL			\$ 817,279	\$ 782,325	\$ 785,055	\$ 766,373	\$ 793,249	\$ 3,944,281
			(5,442)	(9,142)	(6,834)	(19,061)	(1,620)	(42,100)

+ Sample Budget: T32

Contact PI: Pam Factor-Litvak								
http://grants.nih.gov/grants/guide/pa-files/PA-11-184.html								
			YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	
			04/01/14	04/01/15	04/01/16	04/01/17	04/01/18	
PERSONNEL (not included in SF424 budget)	Salary	Effort	03/31/15	03/31/16	03/31/17	03/31/18	03/31/19	Total
Pam Factor-Litvak, PI		10%	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Robin Whyatt								
Total Salary			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Fringe @31%			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Salary & Fringe			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Trainees								
Stipends			2/1	3/2	4/2	4/2	4/2	
Predoctoral Students (\$22,032 per student)			\$ 44,064	\$ 66,096	\$ 88,128	\$ 88,128	\$ 88,128	\$ 374,544
Postdoctoral Students (\$54,180 per student)			\$ 54,180	\$ 108,360	\$ 108,360	\$ 108,360	\$ 108,360	\$ 487,620
Tuition/Fees								
Predoctoral Students			\$ 32,000	\$ 48,000	\$ 64,000	\$ 64,000	\$ 64,000	\$ 272,000
Postdoctoral Students			\$ 16,000	\$ 20,500	\$ 20,500	\$ 20,500	\$ 20,500	\$ 98,000
Travel								
Predoctoral Students			\$ 4,000	\$ 6,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 34,000
Postdoctoral Students			\$ 2,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 18,000
Training Related Expenses								
Predoctoral Students			\$ 8,400	\$ 12,600	\$ 16,800	\$ 16,800	\$ 16,800	\$ 71,400
Postdoctoral Students			\$ 7,850	\$ 15,700	\$ 15,700	\$ 15,700	\$ 15,700	\$ 70,650
Subtotal			\$ 168,494	\$ 281,256	\$ 325,488	\$ 325,488	\$ 325,488	\$ 1,426,214
TOTAL DIRECT			\$ 168,494	\$ 281,256	\$ 325,488	\$ 325,488	\$ 325,488	\$ 1,426,214
MTDC			\$ 120,494	\$ 212,756	\$ 240,988	\$ 240,988	\$ 240,988	\$ 1,056,214
IC (8%)			\$ 9,640	\$ 17,020	\$ 19,279	\$ 19,279	\$ 19,279	\$ 84,497
TOTAL			\$ 178,134	\$ 298,276	\$ 344,767	\$ 344,767	\$ 344,767	\$ 1,510,711
Stipends								
Predoctoral Students: \$22,032/student (NRSA guideline)								
Postdoctoral Students: \$54,180/student (NRSA guideline based on maximum years of experience)								
Tuition and Fees								
Predoctoral Students: \$16,000 maximum/student								
Postdoctoral Students: \$16,000 maximum/student								
1 postdoc will enroll in MS program, 1 postdoc will not enroll in degree program and will only receive \$4,500/year in tuition & fees								
Training Related Expenses								
Predoctoral Students : \$4,200/student								
Postdoctoral Students: \$7,850/student								

+ Detailed Budget Justifications

- For NIH/PHS Agencies, the following budget categories must be justified, where applicable: **Equipment; Travel; Participant/trainee support; Other direct costs.**
- Use this section to list the names, role (e.g., PostDoc or Graduate Student), associated months, salary and fringe benefits for all **Postdocs and Graduate Students.**
- Include a justification for any **significant increases or decreases** from the initial year budget.
- Justify budgets with more than a standard escalation from the initial to the future year(s) of support.
- If the application includes a subaward/consortium budget, a separate budget justification is submitted for that budget.
- Budget Justification Page limits:

Agency	Page Limit
NIH/PHS Agencies	No page limit.
NSF	3 pages.
Other Agencies.	Consult application guidance or talk to DA/grants administrator or R ² .

+ Modular Budget justifications (for NIH/ PHS Agencies)

Include:

- *Personnel Justification:* Name, role, and person-months for each person on the project. Do not include salary and fringe benefit rate in the justification.
- *Consortium Justification:* Total costs (direct costs plus F&A costs) of all sub-awards rounded to the nearest \$1,000. Include roles and person months of all subaward personnel; if the consortium is foreign, that should be stated.
- *Additional Narrative Justification:*
 - Explanations for any variations in the number of modules requested annually
 - Any direct costs that were excluded from the F&A base calculation (e.g., equipment, tuition remission)
 - Any work being conducted off-site, especially if it involves a foreign study site or an off-site F&A rate.

+ Internal Requirements

1. Salary confirmations and RASCAL approvals
2. In-kind support and corresponding approvals
3. Conflict of interest disclosure and RASCAL certifications

+ Internal Requirements

Salary confirmations and RASCAL approvals

Salary confirmations are required for all named Columbia faculty and staff listed on the proposal. These confirmations should come via email from the faculty or staff member's division or department administrator and need to be current for the fiscal year in which the grant is being submitted.

RASCAL is the proposal tracking system that is used university-wide to collect data on submitted proposals. Before an application can be submitted to a funding agency, the submitting PI and the department/division administrators of all participating individuals have to approve the RASCAL. This is true even when there is no salary support and people are listed with in-kind effort or as mentors (such as on a training grant application).

+ Internal Requirements

Conflict of interest disclosures and RASCAL certifications

All named individuals listed on a grant applications and any consultants identified as key personnel are required to complete annual conflict of interest disclosures and RASCAL trainings for HIPAA and human subjects research. These trainings and certifications should be completed well in advance of the application due date.

Subcontract institutions are also required to file certifications attesting that they either have or will have by the time an award is issued a financial conflict of interest policy. Many domestic institutions are listed on the FDP website, but international institutions frequently are not. A certification is available in a word document that the international organizations can complete, sign, and return with their completed subcontract package.

+ Internal Requirements

In-kind support and corresponding approvals

If an individual is being listed on a grant application without measurable effort but without salary support, an in-kind letter is needed in order to confirm that the listed effort will be funded by another (non-sponsored) source. This happens frequently with training grant applications, where salary support is not an allowable budget item, and occasionally with regular research grants where sufficient funding is not available for to cover all investigator effort.

The letters must be signed by the department chair of the individual receiving in-kind support or the funding department (if they are different) and a senior financial business officer. Charles Berolo, Associate Dean for Finance at MSPH, signs letters for all individuals within MSPH.

+ Agency Requirements

1. Consultant letters of support
2. Subcontract agreements
3. Letters of support for service agreements

+ Agency Requirements

Consultant letters of support

Any individual listed as a consultant on the budget proposal needs to submit a letter of support that will summarize the scope of their work on the proposed research grant, and will also outline their annual and cumulative costs to the grant. The consultant letter must also include confirmation that all work for the proposal will be done on the consultant's own time, and that no resources will be used from their primary institution or organization.

Sample letters of support are available from the R² office.

+ Agency Requirements

Subcontract agreements

In order for an organization to be listed as a subcontract, we must include the following in the proposal:

- A budget template consistent with the parent application
- A budget justification consistent with the parent application
- A signed subcontract facepage that names the prime institution, the submitting institution, the dates and title of the proposal, and the requested budget details
- A scope of work that outlines the expectations of the subcontract performance over the full lifecycle of the proposed grant
- A facilities and resources document
- Biosketches for all named key personnel

A consortium arrangements document will also be required as a separate attachment if there is subcontract activity.

+ Agency Requirements

Letters of support for service agreements

If you have planned to contract with a third party to perform specific services in support of your research aims, such as data collection or database cleaning, and have identified this organization prior to the grant submission, you will need to include a letter of support from that organization. The letter should include a brief description of what the service provider will be expected to do during the course of the study, and should also include a price estimate based on available information. This letter of support helps to justify the amount requested in the budget and justification.

+ Resources

Internal:

- Columbia University Sponsored Projects Handbook: Chapter V. Preparing a Sponsored Project Budget: <http://evpr.columbia.edu/content/complete-sponsored-projects-handbook-download> (uni and password protected)
- Columbia University Institutional Information (current indirect cost rates, fringe rates, etc.): <http://spa.columbia.edu/proposals/institutional-information>

NIH/ PHS Agencies:

- Developing your budget: http://grants.nih.gov/grants/developing_budget.htm
- NCI Quick Guide for Grant Applications: <http://deainfo.nci.nih.gov/extra/extdocs/gntapp.pdf>
- NIH Developing your budget podcast: <http://nexus.od.nih.gov/all/2011/04/29/developing-your-budget-podcast/>
- Revised Policy on the Acceptance for Review of Unsolicited Applications that Request \$500,000 or More In Direct Costs: <http://grants.nih.gov/grants/guide/notice-files/NOT-OD-02-004.html>
- Types of grant programs/ Grant activity codes: http://grants.nih.gov/grants/funding/funding_program.htm

Other external:

- NSF Sample budget/ budget justification: http://www.nsf.gov/eng/iip/sbir/samplebudget_and_justification.pdf

+ R² Contact Info

Website:

<http://www.mailman.columbia.edu/faculty-staff/research-resources-r2-office>

Email:

ckk7@columbia.edu

Phone:

212-305-3615

COLUMBIA BUDGET JUSTIFICATION PRIME (P01)

Fringe benefits are calculated at 30% of salaries for years 01-05, as per the **Columbia University** approved rate.

Key Personnel

Pam Factor-Litvak, PhD, Principal Investigator (contact), 2.4 CM effort in year 1, 0.6 CM effort in years 2-4 and 2.4 CM effort in year 5. Dr. Factor-Litvak is Associate Professor of Epidemiology at CUMC and Associate Dean for Research Resources at the Mailman School of Public Health. She is internationally known for her expertise in environmental life course epidemiology, including studies of prenatal exposures to lead and endocrine disruptors and more recently, work on social disparities and health outcomes over the life course. She is a multiple principal investigator (with Dr. Susser) on the Prenatal Determinants of Telomere Length Study, and the principal investigator on the Pregnancy Outcomes of Hurricane Sandy study, both using the NuMom2Be sample. She will take full responsibility for all aspects of the study, including overall supervision the data collection, supervision of the data base and the statistical analysis, interpretation of results and dissemination of research findings. She will chair weekly meetings of the staff for this project (project 2) and participate fully in meetings related to the entire program project. Her effort is high in year 1, when the logistics of the study are being developed, and in year 5, when data analysis and interpretation are primary and when the results will be disseminated. During the years of data collection (years 2-4), her effort decreases to that required to oversee the collection activities.

Ezra Susser, MD, DrPH, Principle Investigator (multiple), 1.2 CM effort in year 1, 0.6 CM effort in years 2-4, and 1.2 CM effort in year 5. Dr. Susser is a distinguished life course and psychiatric epidemiologist and is head of the Imprints Center for Life Course Studies at the Mailman School of Public Health. Dr. Susser is a multiple principal investigator on the Prenatal Determinants of Telomere Length study (with Dr. Factor-Litvak) and a multiple principal investigator on a study of the life course determinants of disparities in health (Dr. Factor-Litvak is a co-investigator on that study). Dr. Susser will work with Dr. Factor-Litvak in all aspects of study management and play a large role in data interpretation and dissemination of research findings. His effort is higher in year 1, when the logistics of the study are being developed, and in year 5 when data analysis and interpretation are primary. During the years of data collection (years 2-4), his effort decreases to that required to assist in the overseeing of data collection activities.

Xinhua Liu, PhD, Co-Investigator, 1.8 CM effort in year 1, 0.6 CM effort in years 2-4, and 3.0 CM effort in year 5. Dr. Liu will serve as the project statistician. She has a long history of collaborative work in complex epidemiological projects, and has worked with Dr. Factor-Litvak for over 20 years. Dr. Liu will be responsible (with Drs. Factor-Litvak, Susser and Peterson) for planning and implementing the study design, and for planning and implementing the data analysis. She will collaborate with Drs. Bansal and Peterson on all analyses pertaining to the imaging data and will supervise the data analysis of the cognitive data.

Ronald Wapner, MD, Co-Investigator, 0.6 CM effort in years 1-5. Dr. Wapner is the principal investigator on the NICHD NuMom2Be parent study. Together with his staff (budgeted in the patient recruitment costs), he will provide continuity for the participants in terms of recruitment and participation. Dr. Wapner will also participate in the data interpretation and dissemination activities.

Bradley Peterson, M.D., Co-Investigator, 2.40 CM effort in year 1, 1.20 CM effort in years 2-4 and 2.40 CM effort in year 5. Dr. Peterson is the Suzanne Crosby Murphy Professor in Pediatric Neuropsychiatry with Tenure, and Director of the Center for Developmental Neuropsychiatry in the Department of Psychiatry at the Columbia University Medical Center and New York State Psychiatric Institute. He is internationally renowned for his expertise in pediatric neuroimaging across a wide range of disorders and conditions. Dr. Peterson will coordinate all of the imaging-related personnel of this study and oversee all quality control activities. He will also oversee all image acquisition, image processing, statistical analyses, interpretation of results, and the preparation of manuscripts related to imaging, and he will assist in the dissemination of the research findings. His effort will be highest in Year 1, when he will need to dedicate the most time to training of staff in the

necessary procedures and the image processing pipeline for the project, and in Year 5, when he will need to oversee the statistical analyses and interpretation of imaging findings.

Diane Levy, MPH, MS, Co-Investigator, 1.8 CM effort in year 1, 0.6 CM effort in years 2-4, and 1.2 CM effort in year 5. Ms. Levy will serve as the data manager for this project. In year 1, she will incorporate the baseline pregnancy data from the NuMom2Be study (which will be obtained from RTI, the data management office for NuMom2Be) into a project specific database. She will also be involved in the development of data collection instruments and the programming of those instruments into the data base. In years 2-4 she will maintain the data base. In year 5, Ms. Levy will prepare data sets for statistical analysis and assist in data analysis and dissemination of results.

Ravi Bansal, Ph.D., Anatomical MRI Signal Processor, 0.3 CM effort in year 1, and 0.6 CM effort in year 2-5. Dr. Bansal is an Associate Professor in the Department of Psychiatry at Columbia University Medical Center and New York State Psychiatric Institute. He is an expert in the processing of medical images, particularly strategies for the segmentation and nonlinear warping of anatomical MR images. He has worked and published extensively in the application of cutting-edge anatomical imaging technologies to the study of normal development and developmental psychopathologies. He will be responsible for development, maintenance, and implementation of the sophisticated computer algorithms used for anatomical image processing and analyses, and he will most immediately supervise the research assistants who are implementing those procedures. His work on the image processing algorithms used for this project will begin in Year 1 and will continue throughout the duration of the project.

Zhishun Wang, Ph.D., fMRI Signal Processor, no salary in year 1, 0.2 CM effort in 2 and 0.3 CM effort in years 3-5. Dr. Wang is an Associate Professor at Columbia University Medical Center and New York State Psychiatric Institute who is an expert in fMRI signal processing. He will oversee processing and analysis of all resting state and perfusion (ASL) data for this study.

Dongrong Xu, Ph.D., Diffusion Tensor Imager, no salary in year 1, 0.18 CM effort in years 2-4 and 0.26 CM effort in year 5. Dr. Xu is an Associate Professor at Columbia University Medical Center and New York State Psychiatric Institute. He is a Computer Scientist and Engineer who is an expert in the processing and visualization of Diffusion Tensor images. He will be responsible for overseeing the processing and analyses of DTI data.

Support Personnel

Katrina Kezios, MPH, Project Coordinator, 12.0 CM effort in year 1, 6.0 CM effort in year 2, 3.0 CM effort in years 3-4, and 9.0 CM effort in year 5. Ms. Kezios will coordinate all aspects of the project, including the development of recruitment and data collection protocols, the development of the data base as well as train and supervise the TBN research assistant. Ms. Kezios has been performing these tasks for a number of large projects, including the Prenatal Determinants of Telomere Length project, and is therefore familiar with the NuMom2Be procedures. As she is also a talented data analyst, she will work with Dr. Lu in year 5 on the data analysis, and assist in data interpretation and dissemination.

TBN, Research Assistant, 3.0 CM in year 1, 12.0 CM in years 2-4, and 3.0 CM in year 5. The research assistant will be responsible for all subject related procedures during the course of the study. Once the subject is recruited, (s)he will arrange for the clinic visit, administer the neurocognitive battery, administer questionnaires to the mother, and remain with the child throughout the MRI scan. During the last quarter of year 1, (s)he will be trained in all procedures so data collection can commence once the first child turns age 5 years in year 2. Years 2 to year 4 will be devoted to data collection. In the first quarter of year 5, the research assistant will complete all tasks related to data collection.

Yuankai Huo, Research Assistant, 5.0 CM effort in year 1, 2.4 CM effort in years 2-5. Mr. Huo will assist the above faculty with transfer of data from the scanner console to servers in the image processing lab, quality control assessment for the images, and all image processing of anatomical, functional, and DTI data. Training to criterion reliability on image acquisition and processing will begin intensively in Year 1, and his work on image processing will continue throughout the duration of the project.

Ming Qian, Network Administrator, 9.0CM effort in year 1, 0.6 CM effort in years 2 to 5: Mr. Qian is an expert computer programmer and network administrator who will maintain all network connectivity and system maintenance for all the UNIX workstations and PCs used for image processing and integration with the behavioral database as well as the fiber optic backbone that supports data transfer among the MRI console and the various lab servers and workstations. He will also oversee maintenance and backup of the imaging databases for the study. He will set up the image processing workstations and establish their network connectivity with one another and the servers within the MRI unit in Year 1, then maintain them throughout the duration of the project.

OTPS

Travel. A total of \$5000 is requested in year 5 to support attendance at one scientific meeting each for Drs. Factor-Litvak, Susser and Peterson to present results related to the project.

Computer. One computer, one additional monitor and one set of speakers is requested in year 1 for the administration of the NIH Toolbox battery of tests.

Supplies and Software. In year 1 we will purchase licenses for all neuropsychological tests as well as scoring software and administration forms.

Data Use Agreement. In year 1, we will compensate RTI \$10,000 in preparation costs for the required data set from the NuMom2Be study.

Subject Recruitment Costs. Subject recruitment will be performed by the NuMom2Be staff in Dr. Wapner's offices. Recruitment costs include patient tracking, screening for eligibility, and obtaining informed consent. We will recruit 240 subjects (60 in year 2, 90 in year 3 and 90 in year 4) for totals of \$4800, \$7200, and \$7200 in years 2, 3 and 4, respectively.

Subject Compensation. Each subject will be compensated \$200 for their time and effort. This totals \$12,000, \$18,000 and \$18,000 in years 2, 3 and 4, respectively.

Annual Computer operation support fees. The Columbia University Mailman School of Public Health is committed to providing the computer equipment and network infrastructure necessary for the Department of Biostatistics to complete the work described in this proposal. It is, however, the Department's responsibility to fund equipment maintenance, computer software, and supplies, and general systems support not linked to specific projects. This support is provided by a network administrator, whose responsibilities include providing network and database security; user support; research, evaluations and implementation of new computing hardware and software; and general system administration. The department generates funding for biostatistical computing support to projects by assessing each a Computer Operations Support Fee (COSF) based on the percent effort of Biostatistics personnel on the project. (The fee we use is \$4,426 per FTE.) These costs are based on the CM efforts for Dr. Liu and Ms. Levy.

Subcontract with Research Foundation for Mental Health

All MRIs will be performed and processed at the Research Foundation for Mental Health, located at the New York Psychiatric Institute adjacent to Columbia Presbyterian Medical Center. A breakdown of direct and indirect costs for all years is provided below.

RFMH	YR1	YR2	YR3	YR4	YR5	Total
Direct	71,454	130,065	152,446	157,961	121,199	633,125
Indirect	42,729	77,779	91,163	94,461	72,477	378,609

Budget Justification (R01)

Overview: This project has three PIs: Pam Factor-Litvak (contact PI, Columbia University), Ezra Susser (PI, Columbia University), and Abraham Aviv (PI, New Jersey Medical School, Rutgers University). The distinctive contributions of the three PIs are detailed in the multiple PI section. We note here that Aviv is a telomere biologist who will conduct the measures of leukocyte telomere length (LTL) and that Aviv's budget justification is provided separately in the Rutgers subcontract.

The project will be conducted as an ancillary study to the NICHD Nulliparous Pregnancy Outcomes Study Monitoring Mothers-to-be and our currently funded projects, Prenatal Determinants of Telomere Length (R01 HD071180) and Effects of a Major Climatic Event -Superstorm Sandy- on Pregnancy Outcomes and Telomere Length (R21 ES023582). At the Columbia University consortium (which includes Columbia University Medical Center and Christiana Care Health Care Services) approximately 2000 nulliparous women will be recruited for the parent study. We anticipate that 660 mother/father/newborn trios will participate in our ongoing studies. In this proposal we plan to follow the children 3 times over the first 5 years of life; at approximately age 1-2, age 3-4 and age 5-6, to examine the determinants of the rate of telomere attrition. As detailed in the approach, we anticipate a 95% participation rate of all eligible at each follow up and propose a clinic visit of 1.5 hours. The visit will include anthropometric assessments of the newborn, questionnaire administrations to the mother (including assessments of the home environment and of the child's development), and a blood draw from the children to measure leukocyte telomere length and measures of inflammation. This will be the first prospective evaluation of leukocyte telomere attrition in a well described birth cohort.

Personnel:

All fringe benefits are calculated at 30% of personnel expenses. All salaries are increased, except where capped at Executive Level II, at 2% per year for cost of living increases.

Pam Factor-Litvak, Contact Principal Investigator (2.4 cal. months in YR1; 1.2 cal. months in YRS2-4; 1.8 cal. months in YR5)

Dr. Factor-Litvak is a well-known environmental life course epidemiologist who has substantial experience managing and coordinating large studies involving multiple data collection sites and investigators. As one example, she is the co-Principal investigator of the EHF Birth Cohort, which is recruiting 500 mother-father-newborn trios at two sites in Israel to investigate the associations between prenatal exposures to brominated flame retardants and phthalates on pregnancy outcomes and thyroid function. That project is establishing a contaminants laboratory in Israel (none exists now), which requires frequent contact with international expert laboratories. Dr. Factor-Litvak is also the PI of the Hurricane Sandy project, which is examining associations between exposure to that event in specific trimesters of pregnancy and LTL. Currently, she also serves as the Associate Dean for Research Resources at the Mailman School of Public Health, a role which enhances the research infrastructure and brings investigators from different disciplines together.

Investigation of the environmental determinants of early life LTL attrition is of central importance to Dr. Factor-Litvak's program of research on prenatal and early life determinants of offspring health over their life course. She is particularly interested in the role of prenatal exposure to perfluorinated compounds (PFCs) which have been associated with metabolic outcomes in early adulthood and in the role of adverse childhood experiences, their associations with inflammation and the result on LTL attrition. Such exposures in prenatal and early life are amenable to public health interventions.

Dr. Factor-Litvak will be responsible for the overall management and scientific oversight of the project, and for ensuring coordination among the components of the grant, including the fieldwork team (Drs. Wapner and Hoffman), Dr. Aviv's laboratory at New Jersey Medical School, the laboratory at the Centers for Disease Control and Prevention and the laboratory at Children's Hospital/Harvard University. She will contribute significant scientific expertise, will chair bimonthly calls with the scientific teams, and will work collaboratively on the data analytic plan and on preparation of manuscripts. Her effort is higher in years 1 and 5 as required for intensive periods of project initiation and for data analysis/manuscript preparation.

Ezra Susser, MD, DrPH, Principal Investigator (1.2 cal. months in YR1; 0.6 cal. months in YRS 2-5)

Dr. Susser is a renowned epidemiologist who has substantial experience managing and coordinating large studies involving multiple data collection sites and investigators. As one example, he was the Principal investigator of the Early Determinant of Adult Health (EDAH) program project in which New England and California birth cohorts from the 1950s and 1960s were followed and assessed at age 45-50. He also has ten years of experience as Department Chair. Currently he directs the Imprints Center for Genetic and Environmental Life Course Studies.

Investigation of the determinants of LTL at birth and in early life is of central importance to Dr. Susser's program of research on prenatal determinants of offspring health over their life course. He is particularly interested in the purported association between older paternal age at conception and longer LTL at birth, and in childhood. This is potentially beneficial to offspring health, in contrast to the associations he has previously found between older paternal age at conception and adverse outcomes such as autism and schizophrenia. As a psychiatric epidemiologist, he is also especially interested in the relationships between maternal stress during pregnancy, early adversity and LTL at birth and in childhood.

Dr. Susser will work with Dr. Factor-Litvak in all aspects of the project and will lead the project in the event she is unavailable.

Ronald Wapner, MD, Co-Investigator (0.6 cal months in YR1; 1.2 cal months in YRS2-5)

Dr. Wapner is the principal investigator at Columbia for the parent grant, The NICHD Nulliparous Pregnancy Outcomes Study Monitoring Mothers-to-be. Dr. Wapner has a long history of collaborative multicenter projects. His oversight of the recruitment and data collection for mother-father-baby trios will be crucial to the success of the study. In years 4 and 5, Dr. Wapner will contribute scientifically to the data analytic plan and to manuscript preparation.

Xinhua Liu, PhD, Co-Investigator (1.8 cal. months in YR1; 1.2 cal. months in YR2; 0.6 cal. months YR3; 1.2 cal. months in YR4; 1.8 cal. months in YR5)

Dr. Liu will serve as the project biostatistician. She has a long working relationship with Dr. Factor-Litvak. Among Dr. Liu's areas of expertise is the analysis of repeated measures and trajectories. Dr. Liu will contribute to the ongoing discussions of performance and data quality, and if needed, modifications in design and analytic plans. Dr. Liu's efforts are highest in the start up phase of the project and in year 5, when data analysis will occur.

Diane Levy, MS, Co-Investigator (1.2 cal. months YRS1-5)

Ms. Levy will serve as the data manager for the project. She is highly experienced and leads the data management consultation service in the Department of Biostatistics. Ms. Levy will assist in the design of all data collection instruments, will develop the project data base, will merge the project data base with data from the NuMom2Be study, and will clean and prepare data sets for analysis.

Sudha Kashap, MD, Co-Investigator (0.6 cal. months YRS1-5)

Dr. Kashap will serve as the supervising pediatrician for the project. She will train the research assistant in all anthropometric assessments and supervise the phlebotomy. Dr. Kashap will also perform periodic reliability studies for the anthropometric assessments. She will also contribute scientifically to the data analytic plan and to manuscript preparation.

Katrina Kezios, MPH, Project Coordinator, (6.0 cal. months YRS1-5)

Ms. Kezios is the current research assistant for the ongoing projects. She will continue in this role and take charge of the data logistics, such as transfer of data forms to Ms. Levy, as well as develop the study codebook, perform statistical programming to create variables, etc. She will also assist Drs. Factor-Litvak, Susser and Liu with performing the data analysis and with manuscript preparation.

Research Assistant, TBA (3.0 cal. months YRS1-5)

The research assistant will assist Drs. Factor-Litvak and Susser on all aspects of the study, including communication with all investigators. He/she will also assist Ms. Levy and Ms. Kezios on data related issues.

Project Coordinator, TBA (0.6 cal. months YRS1-5)

The project coordinator will supervise all clinical aspects of the study, including scheduling appointments, space availability, and the availability of the follow up coordinator.

Follow up Coordinator, TBA (4.8 cal. months, YRS1 and 5; 4.2 cal. Months YRS 2-4)

Under the supervision of the project coordinator, the follow up coordinator will locate and contact all members of the cohort and schedule appointments. He/she will be a trained and experienced phlebotomist and will perform all assessments, interview the mothers, and draw the blood samples.

Mirtha DelValle, Program Manager, (0.6 cal. Months YRS 1-4)

Ms. DelValle will be responsible for the overall grant management. She will provide fiscal reporting, as well as maintain project fiscal records. She will perform financial analysis and prepare management reports and projections for ongoing project activities. In addition, she will communicate with investigators regarding fiscal matters. She will also maintain compliance with federal regulations. All activities described above pertain solely to the ongoing functions of this project.

Travel

One domestic trip is requested in each year for either Dr. Factor-Litvak or Susser to present results at a national meeting. We budget meeting registration, air fare and hotel/per diem (for 2 days) at a total of \$1500 each year.

Supplies

General office supplies, including software licenses such as SAS, SPSS, are budgeted at \$2500 in years 1-4 and at \$1500 in year 5.

Laboratory supplies: One recumbent infant scale and one length board are required for the anthropometric assessments at age 1-2. Each are budgeted at \$500 for a total of \$1000. We also budget for the generic version of Emla cream, a topical anesthetic, to assist in the blood draws. Each tube of Emla cream is 30g and will be sufficient for 10 applications. We therefore budget for 200 tubes at a cost of \$3,000. These costs are assumed In Year 2 only.

Laboratory Assays/Expenses

We budget for analysis of prenatal perfluorinated compounds (PFCs) at the Centers for Disease Control. Each assay (for the panel of PFBS, PFDA, PFHxA, PFHxS, PFOA, PFOS) is \$137.62. We budget for 530 assays to be performed in years 2-5 (after the sample is defined) for a total of \$72,483.

We also budget for the analysis of C-reactive protein and IL-6 in blood samples from the children at each follow up visit. These will be performed in the laboratory of Dr. Nadir Rafai at Children's Hospital/Harvard Medical School. A total of 1674 samples will be analyzed (approximately 494 children will have 3 samples and 96 will have 2 samples) at a cost of \$42.18 per sample for a total of \$70,610.

All specimens will be processed and stored in the Center for Environmental Health in Northern Manhattan Core Laboratory facility run by Dr. Regina Santella. There is no charge for the sample storage. Sample processing and supplies are budgeted at \$34/sample for samples taken at Columbia University and \$6/sample for samples shipped from Christiana Care Health Systems. Thus the costs are: \$6,914 in year 1; \$5,808 in year 2; \$6,534 in year 3; \$5,518 in year 4; and \$6,234 in year 5.

We will ship buffy coats on a yearly basis to Dr. Aviv's laboratory in New Jersey and serum to Dr. Rafai's laboratory in Boston. Costs for shipping are \$200/year.

Subject Costs-Patient Renumeration

We will provide a stipend of \$100 to each family at the time of their visit for any expenses incurred for a total cost of \$80,300. We expect to see 173 families in Year 1, 159 families in Year 2, 164 families in Year 3, 151 families in Year 4, and 156 families in Year 5, for a total of 803 families.

Computer Operations Support Fee (COSF)

The Department of Biostatistics at Columbia University assesses a fee for computer operations support equivalent to \$4,426 per FTE for the participation of Biostatistics faculty in research projects. These charges are for Dr. Liu and Ms. Levy with a COLA of 2% increase in each year.

Communications

Phones, faxes and postage are budgeted at \$150 per month, with a cost of living adjustment of 2% increase in each year.

Data Management

Fee for Service to Research Triangle Institute (RTI): RTI has served as the data management facility for the NuMom2Be study. This fee for service (\$10,000 in year 1 and \$10,000 in year 2) is to facilitate and reimburse them for expenses related to the preparation of the data set required for the proposed project.

Subcontracts

We subcontract with New Jersey Medical School/Rutgers University to perform the LTL measures. The total cost of this subcontract is \$1,398,814.

Rutgers	YR1	YR2	YR3	YR4	YR5	Total
Direct	170,075	172,955	175,893	178,889	181,946	879,758
Indirect	100,344	102,043	103,777	105,545	107,348	519,057

We subcontract with Christiana Care Health Systems to perform the field assessments for their telomere sample. The total cost of this subcontract is \$415,072.

CCHS	YR1	YR2	YR3	YR4	YR5	Total
Direct	64,196	36,551	62,504	37,197	64,943	265,391
Indirect	36,207	20,615	35,252	20,979	36,628	149,681

Budget Justification (R21)

Personnel

Pam Factor-Litvak, PhD (1.8 calendar months): will serve as the contact principal investigator on this grant. Drs. Factor-Litvak is one of the multiple PIs on the parent study of Prenatal Determinants of Leukocyte Telomere Length (R01 HD071180). She is an experienced investigator who has led numerous studies of prenatal exposures and outcomes over the life course. Although she and Dr. Monk do not have a history of working on grants together, they both are members of the Imprints Center for Life Course Studies and have jointly supervised students in the Masters in Public Health program. Dr. Factor-Litvak will be responsible for the day to day aspects of the study, for communication between the investigators, and, along with Dr. Monk for scientific leadership, data analysis, interpretation and manuscript preparation.

Catherine Monk (0.6 calendar months): will serve as a multiple principal investigator on this grant. Dr. Monk's interests are in the associations between chronic stress during pregnancy and outcomes in the newborn and child. Specifically, her research aims to identify biological pathways by which maternal prenatal distress affects offspring neurobehavioral development as evidenced in her two currently funded R01s. Dr. Monk will, along with Dr. Factor-Litvak, take a leadership role on the scientific aspects of the study, especially those related to stress in the pregnant woman, data analysis, interpretation and manuscript preparation.

Ezra Susser (0.6 calendar months): will serve as a co-investigator on this grant. Drs. Factor-Litvak and Susser have a long history of collaborative work, and, among other activities are multiple PIs on the parent grant. Dr. Susser is a life course and psychiatric epidemiologist who has vast experience in studying the developmental aspects of psychiatric disorders. He will provide scientific input on all aspects of the data analysis and interpretation.

Xinhua Liu (1.2 calendar months): will serve as the co-investigator and biostatistician on this award. Drs. Factor-Litvak and Liu have a long history of collaborative work, and are currently working on several projects related to life course studies. Dr. Liu will be responsible, with Drs. Factor-Litvak and Monk, for developing the data analytic strategy and its implementation. She will also provide input in data interpretation and manuscript preparation.

Katrina Kezios (6.0 calendar months): will serve as Program Manager and assist Drs. Factor-Litvak and Monk in the day to day aspects of the study, including data management, by providing data management skills and contributing to the analysis. Ms. Kezios also serves as the project coordinator on the parent grant and is very familiar with the data.

Fringe Benefits are calculated at 31% of all personnel expenses, per Columbia's DHHS agreement dated 07/18/2012. A 2% increase is built into salaries on an annual basis effective July 1. Salaries have been capped at Executive Level II where applicable.

BUDGET JUSTIFICATION (T32)

TUITION AND FEES

Year 01: In accordance with the budget instructions in PA-11-184 to request the full needs for tuition and fees, we are requesting tuition of \$39,750 each for two pre-doctoral students on the expectation of a five-year appointment for each, and \$23,850 for one post-doctoral fellow on the expectation of a three-year appointment.

Total for Year 01: Pre-doctoral: \$79,500
Post-doctoral: \$23,850

We understand that the NIH IC (in this case, NIEHS) will apply the appropriate formula to these amounts to determine the funds awarded for this and remaining years.

Year 02: In accordance with the budget instructions in PA-11-184 to request the full needs for tuition and fees, we are requesting tuition of \$39,750 each for three pre-doctoral students. The new pre-doctoral student entering in Year 02 will be for a four-year appointment. We are requesting \$23,850 for one post-doctoral fellow. We also request \$4,500 in tuition and fees for a new post-doctoral fellow entering in Year 2 with the expectation of a two-year appointment, but who will not enroll in a full-time degree program.

Total for Year 02: Pre-doctoral: \$119,250
Post-doctoral: \$28,350

Year 03: In accordance with the budget instructions in PA-11-184 to request the full needs for tuition and fees, we are requesting tuition of \$39,750 each for four pre-doctoral students. The new pre-doctoral student entering in Year 03 will be for a three-year appointment. We are requesting \$23,850 for one post-doctoral fellow. This will be the last year for this post-doctoral fellow. We also request \$4,500 for the post-doctoral fellow who entered in Year 02 and is not enrolled in a degree program. This will be the last year for this post-doctoral fellow.

Total for Year 03: Pre-doctoral: \$159,000
Post-doctoral: \$28,350

Year 04: In accordance with the budget instructions in PA-11-184 to request the full needs for tuition and fees, we are requesting tuition of \$39,750 each for four pre-doctoral students. We are requesting \$23,850 for one new post-doctoral fellow, with the expectation of a two-year appointment. We also request \$4,500 for a new post-doctoral fellow entering in Year 4 with the expectation of a two-year appointment, but who will not enroll in a full-time degree program.

Total for Year 04: Pre-doctoral: \$159,000
Post-doctoral: \$28,350

Year 05: In accordance with the budget instructions in PA-11-184 to request the full needs for tuition and fees, we are requesting tuition of \$39,750 each for four pre-doctoral students. We are requesting \$23,850 for one post-doctoral fellow enrolled in a degree program and \$4,500 for one post-doctoral fellow not enrolled in a degree program.

Total for Year 05: Pre-doctoral: \$159,000
Post-doctoral: \$28,350

STIPENDS

Year 01: We are requesting a stipend of \$22,032 each for two pre-doctoral fellows. We anticipate enrolling a level 7 post-doctoral fellow. Thus, we are requesting a stipend of \$54,180 for the post-doctoral fellow.

Total for Year 01: Pre-doctoral: \$44,064
Post-doctoral: \$54,180

Year 02: We are requesting a stipend of \$22,032 each for three pre-doctoral fellows. We anticipate enrolling a second level 7 post-doctoral fellow. Thus, we are requesting a stipend of \$54,180 for each of the two post-doctoral fellows.

Total for Year 02: Pre-doctoral: \$66,096
Post-doctoral: \$108,360

Year 03: We are requesting a stipend of \$22,032 each for four pre-doctoral fellows. We are requesting a stipend of \$54,180 for each of the two post-doctoral fellows.

Total for Year 03: Pre-doctoral: \$88,128
 Post-doctoral: \$108,360

Year 04: We are requesting a stipend of \$22,032 each for four pre-doctoral fellows. We anticipate enrolling two level 7 post-doctoral fellows. Thus, we are requesting a stipend of \$54,180 for each of the two post-doctoral fellows.

Total for Year 04: Pre-doctoral: \$88,128
 Post-doctoral: \$108,360

Year 05: We are requesting a stipend of \$22,032 each for four pre-doctoral fellows. We are requesting a stipend of \$54,180 for each of the two post-doctoral fellows.

Total for Year 05: Pre-doctoral: \$88,128
 Post-doctoral: \$108,360

TRAVEL

In each year, we request \$2,000 for each fellow to travel to scientific meetings to present their research. Trainees are encouraged to participate in international and domestic meetings and conferences during their period of training support. A breakdown of travel costs by year is as follows:

- Year 1: \$6,000 (two pre-doctoral students and one post-doctoral student)
- Year 2: \$10,000 (three pre-doctoral students and two post-doctoral students)
- Year 3: \$12,000 (four pre-doctoral students and two post-doctoral students)
- Year 4: \$12,000 (four pre-doctoral students and two post-doctoral students)
- Year 5: \$12,000 (four pre-doctoral students and two post-doctoral students)

TRAINING RELATED EXPENSES

Per Kirschstein-NRSA allowances for institutional training grants for pre-doctoral and post-doctoral trainees, we are requesting \$4,200 for each pre-doctoral fellow and \$7,850 for each post-doctoral fellow in all five years of the program to defray other costs of training and health insurance. A breakdown of travel costs by year is as follows:

- Year 1: \$16,250 (two pre-doctoral students and one post-doctoral student)
- Year 2: \$28,300 (three pre-doctoral students and two post-doctoral students)
- Year 3: \$32,500 (four pre-doctoral students and two post-doctoral students)
- Year 4: \$32,500 (four pre-doctoral students and two post-doctoral students)
- Year 5: \$32,500 (four pre-doctoral students and two post-doctoral students)