

Measuring the Joint Effect of Air Pollution and Psychosocial Stress on Telomere Length

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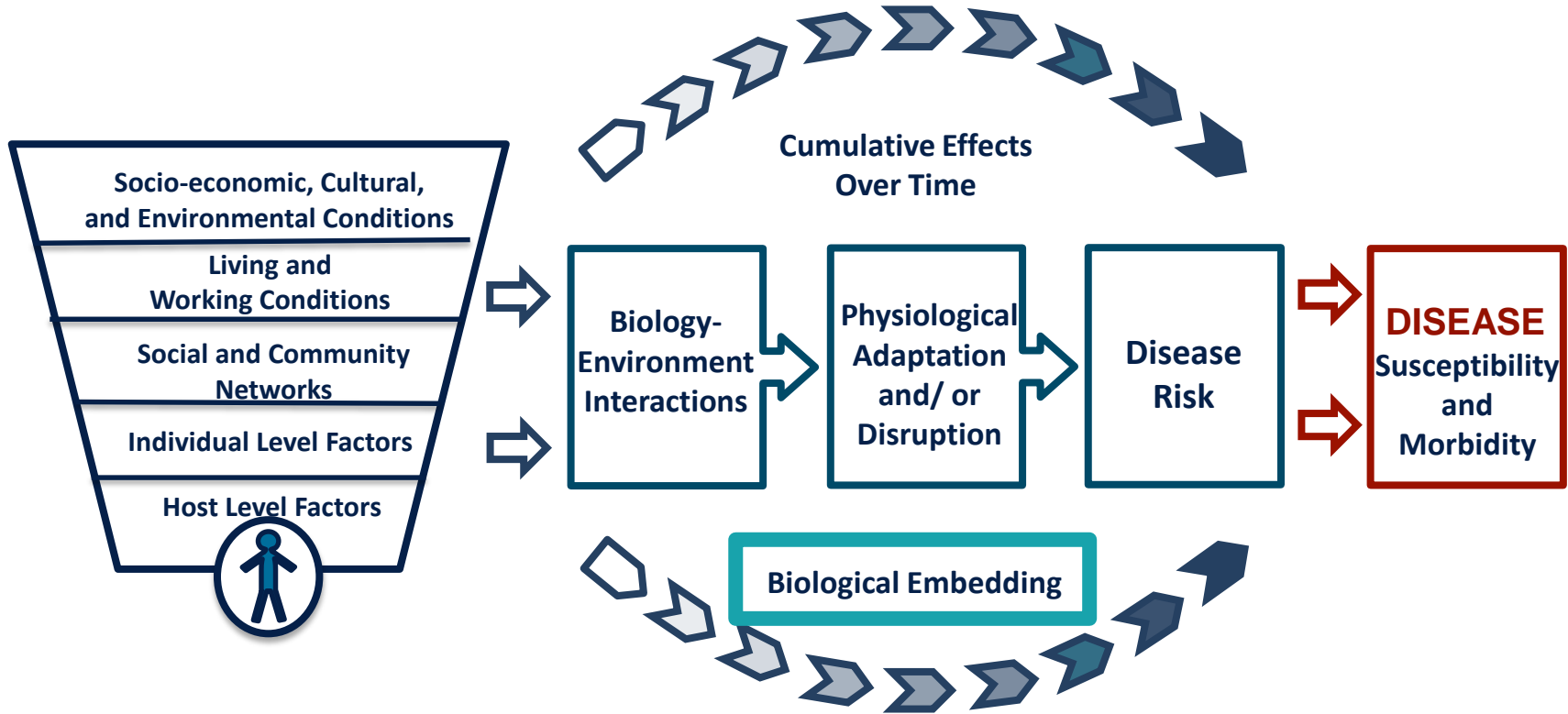
Postdoctoral Scholar

TRN Pilot Award Project

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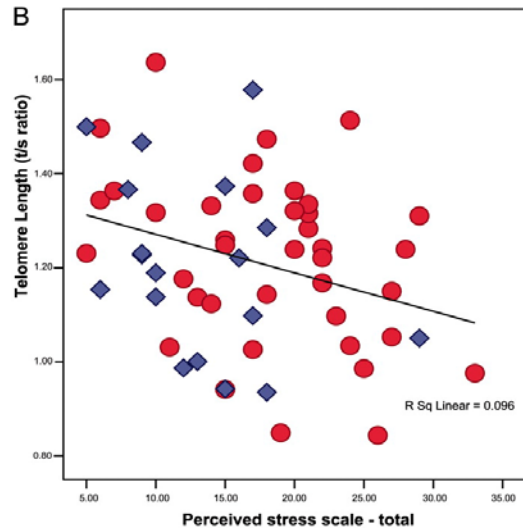


Long Term Effects of Social and Environmental Exposures



Caregiver Stress and Telomere Length (TL)

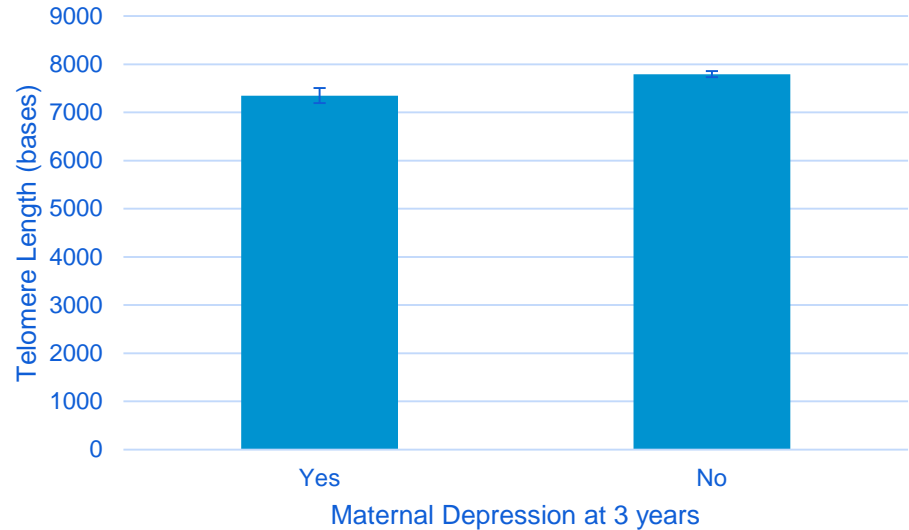
Caregiver stress → ↓ Caregiver TL



Controls (blue) $r = -0.34$

Caregivers (red) $r = -0.36$

Maternal Depression → ↓ Child TL ~450bp
(4 & 5 years)



Caregiver Stress Modifies the Effect of Traffic-Related Air Pollution on Incident Childhood Asthma



Air Pollutants are Associated with Decreased Telomere Length

TABLE II. Association between aTL and annual average exposures to O₃ and PM_{2.5}: 2006-2014

Variable name (n = 1072)	aTL (kb [95% CI])	P value
O ₃ (ppb)	-37.1 (-66.7 to -7.4)*	.01
PM _{2.5} (μg/m ³)	-57.1 (-118.1 to 3.9)	.07
African ancestry (%)	8.4 (0.8 to 15.9)*	.03
Age (y)	-26.1 (-52.3 to 0.1)	.05

Estimates are provided as change in mean aTL (kb/diploid) for 1-ppb and 1 μg/m³ increases in O₃ and PM_{2.5}, respectively, for annual average (past-year) exposures. A multivariable linear regression model was adjusted for air pollutants (O₃ and PM_{2.5}), age, sex, African ancestry, asthma status, number of household smokers, recruitment season, and maternal education.

**P* < .05.

Hypothesis and Research Question

Hypotheses:

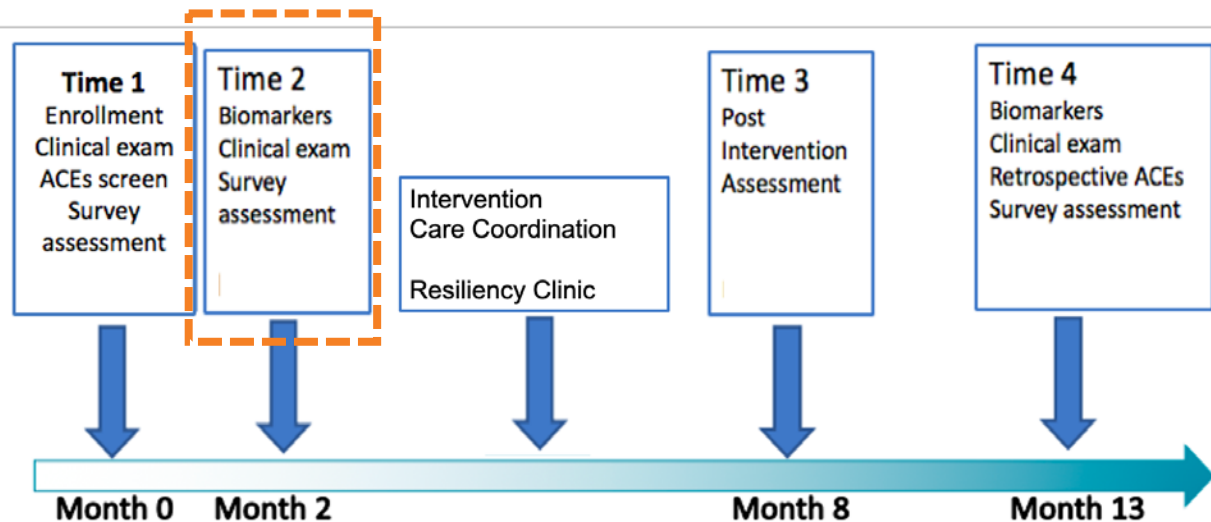
1. Caregiver stress and air pollution exposure independently decrease telomere length.
2. The negative association between air pollution exposure and telomere length is stronger among children that experience higher levels of caregiver stress.

Research Question: What is the independent and joint effect of caregiver stress and air pollution exposure on relative telomere length?



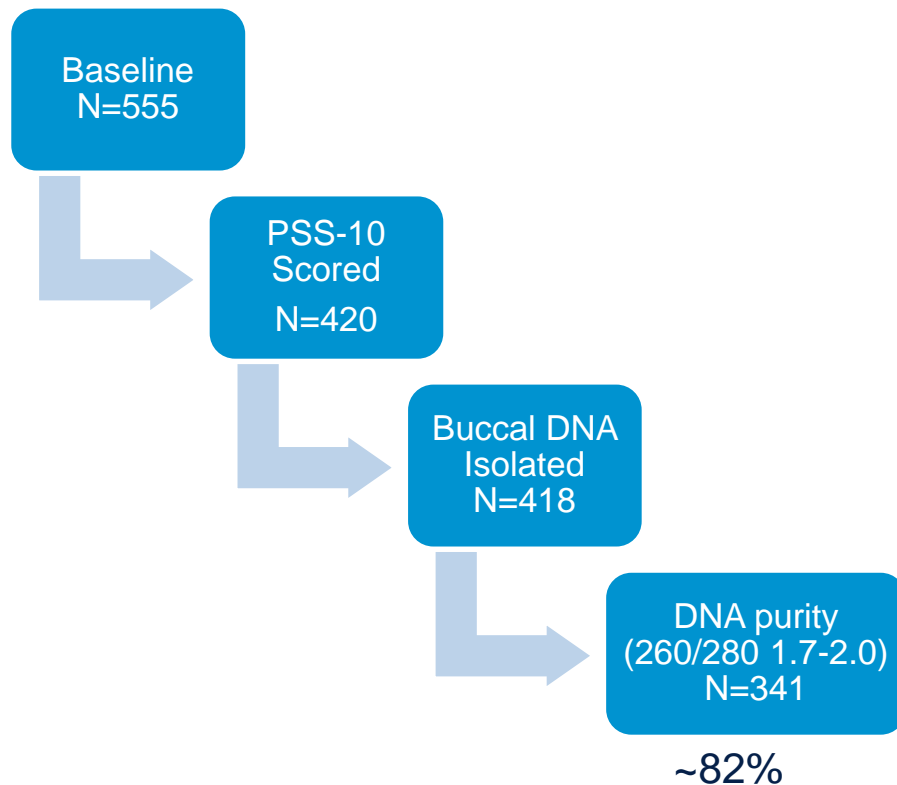
Bay Area Research Consortium on Toxic Stress and Health *PEdiAtric ResiLiency and ACEs Study (PEARLS)*

555 children (6mo-11yrs) in Oakland recruited during well-child checks



Study Population

Characteristic	N (%)
All	555
Age, median (IQR)	5.8 (2.6-8.9)
Sex	
Male	291 (52)
Female	264 (48)
Race/Ethnicity	
Black	311 (56)
White	22 (4)
Hispanic	92 (16.6)
Other	130 (23.4)
Caregiver PSS, median (IQR)	21.0 (18.0-24.0)
Obesity	136 (25)
Asthma	226 (41)

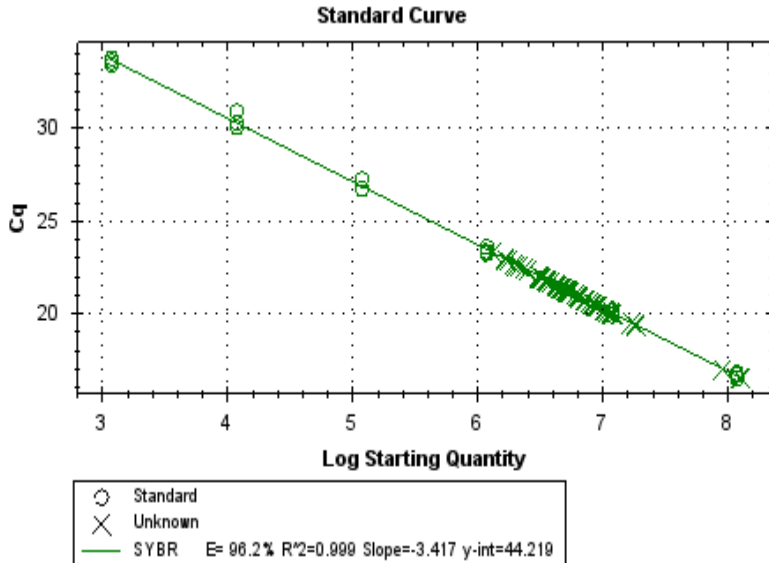


Telomere qPCR Assay

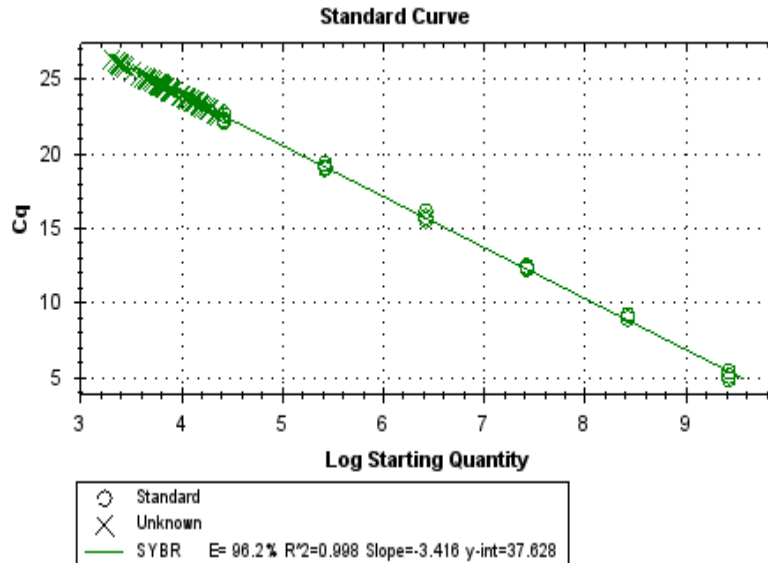
O'Callaghan and Fenech (modified Cawthon's method)

Samples run in triplicate on sample plate with 1301 control DNA and NTC

Telomere Standards



36B4 Standards



Methods and Future Analytical Plan

Caregiver Stress

- ✓ PSS-10 Questionnaire



Air Pollution Exposure

Based on geocoded residence

- Ozone
- PM 2.5
- NO₂
- Mixture Effect

12 months prior to collection



Relative Telomere Length

- ✓ qPCR T/S method
- Next Step:** Data analysis and ICC

Adjust models for:

- Child age
- Sex
- Race/ethnicity

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