Concept Paper Form

Provisional Paper Title: Cardiovascular reactivity and associations with childhood predictors, psychosocial correlates, and health outcomes: Using data from the Dunedin and MIDUS Studies
Proposing Author: Kyle Bourassa
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P.I. Sponsor: Terrie Moffitt and Avshalom Caspi
Today's Date: 10/30/2019

Objective of the study:

Greater cardiovascular reactivity is a well-established predictor of poorer health[1]. Cardiovascular reactivity is thought to lead to the progression of cardiovascular diseases and increased risk of cardiovascular-related mortality through atherosclerotic processes over time[2]. Termed the cardiovascular reactivity hypothesis[2], this observation has led to the inclusion of cardiovascular reactivity assessments in large longitudinal studies as a potential health-relevant biomarker.

Often the studies of cardiovascular reactivity and associated outcomes are limited to either small studies using intensive measurement or smaller subsets of larger epidemiological studies due to the challenges with collecting cardiovascular reactivity data. Although meta-analytic techniques have supported the basic premises of the cardiovascular reactivity hypothesis[1], there is an opportunity to investigate the association of cardiovascular reactivity with relevant outcomes in larger, more representative longitudinal studies, which could provide better evidence for the cardiovascular reactivity hypothesis.

Two large longitudinal studies of aging across midlife, the Dunedin and Midlife in the United States (MIDUS) Studies, included laboratory paradigms that assessed cardiovascular reactivity using largely the same computerized methodology[3]. Despite the availability of cardiovascular reactivity data in these two studies, the association of reactivity with a wide array of potential predictors, correlates, and health outcomes have not been widely tested. The current study proposes to first use data from the Dunedin Study (n = 937) to examine the association of cardiovascular reactivity, assessed using heart rate and blood pressure, with relevant outcomes across the lifespan, then use MIDUS Study data (n = 1,173) to replicate these analyses in order to increase confidence in any observed associations.

Data analysis methods:

Aim 1: Investigate the association of cardiovascular reactivity at age 32 with childhood predictors, psychosocial correlates, and health outcomes in independent multiple regression models.

Aim 2: Replicate the primary associations between cardiovascular reactivity assessed in the MIDUS 2 Biomarker Assessment and childhood predictors, psychosocial correlates, and health outcomes using MIDUS Study variables that can be matched with Dunedin Study variables.

Secondary Analyses: Characterize the results of Aims 1 and 2 using the variables within the Dunedin and MIDUS datasets in secondary analyses that might contextualize the primary aims.

General analysis methods: All models will be run in MPLUS[4] using full information maximum likelihood estimation to account for missing data[5].

<u>Variables needed at which ages:</u>

- Dunedin Study
    - Cardiovascular reactivity
        - Heart rate
            - During baseline
            - During the Stroop task
            - During the math task
        - Systolic and diastolic blood pressure
            - During baseline
            - During the Stroop task
            - During the math task
        - Task covariates
            - Percent of correct responses to Stroop and math tasks
    - Childhood predictors
        - Childhood IQ
        - Childhood health
        - Childhood ACEs (prospective)
        - Childhood SES
    - Psychosocial correlates
        - Perceived stress scale at age 32
        - Conscientiousness averaged across ages 26, 32, and 38
        - Adult IQ at age 38 (not assessed at age 32)
        - Satisfaction with life scale at age 38 (not assessed at age 32)
    - Health correlates and outcomes
        - Self-rated health at age 38
        - Inflammation
            - Log transformed hsCRP at age 38
        - Facial age at age 38
        - Pace of aging from age 26 to 45
    - Demographic
        - Sex
- MIDUS Study
    - Cardiovascular reactivity
        - Heart rate
            - During baseline
            - During the Stroop task
            - During the math task
        - Systolic and diastolic blood pressure
            - During baseline
            - During the Stroop task
            - During the math task

        - Task covariates
            - Stress appraisals for the Stroop and math tasks
    - Childhood predictors
        - Retrospective reports of abuse in childhood at MIDUS 2 Biomarker Assessment
        - Retrospective reports of childhood SES at MIDUS 2
    - Psychosocial correlates
        - Perceived stress scale at MIDUS 2
        - Conscientiousness at MIDUS 2
        - Satisfaction with life scale at MIDUS 2
        - Adult cognition at MIDUS 2 Cognitive Assessment
    - Health correlates and outcomes
        - Self-rated health at MIDUS 2
        - Inflammation
            - Log transformed CRP at MIDUS 2
        - Mortality assessed in the MIDUS Mortality dataset
        - Date of censoring
        - Date of death
    - Demographic covariates
        - Sex
        - Age
        - Date of MIDUS 2 Biomarker Assessment

Significance of the Study (for theory, research methods or clinical practice):

The cardiovascular reactivity hypothesis is currently a well-supported model for how stress affects health, yet this association has not been tested in large longitudinal datasets, such as the MIDUS and Dunedin Studies, despite the availability of this data. The current study would provide additional empirical evidence relevant to the cardiovascular hypothesis and the use of cardiovascular reactivity laboratory assessments in large longitudinal studies that may be more representative than the typical previous studies of cardiovascular reactivity.

References:

1. Chida Y, Steptoe A. Greater cardiovascular responses to laboratory mental stress are associated with poor subsequent cardiovascular risk status: A meta-analysis of prospective evidence. Hypertension. 2010;55(4);1026-32.
2. Treiber FA, Kamarck T, Schneiderman N, Sheffield D, Kapuku G, Taylor T. Cardiovascular reactivity and development of preclinical and clinical disease states. Psychosom Med. 2003;65(1):46-62.
3. Dienberg Love G, Seeman TE, Weinstein M, Ryff CD. Bioindicators in the MIDUS national study: protocol, measures, sample, and comparative context. J Aging Health. 2010;22(8):1059-80.
4. Muthén LK. & Muthén BO. Mplus User's Guide. Seventh Edition. Los Angeles, CA: Muthén & Muthén. 1998-2012.
5. Graham JW. Missing data analysis: Making it work in the real world. Annu Rev Psychol. 2009;60;549-576.

Data Security Agreement

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☒	I am current on Human Subjects Training (CITI (www.citiprogram.org) or equivalent)
☒	My project is covered by the Duke ethics committee OR I have /will obtain ethical approval from my home institution.
☒	I will treat all data as "restricted" and store in a secure fashion. My computer or laptop is: a) encrypted (recommended programs are FileVault2 for Macs, and Bitlocker for Windows machines) b) password-protected c) configured to lock-out after 15 minutes of inactivity AND d) has an antivirus client installed as well as being patched regularly.
☒	I will not "sync" the data to a mobile device.
☒	In the event that my laptop with data on it is lost, stolen or hacked, I will immediately contact Moffitt or Caspi.
☒	I will not share the data with anyone, including my students or other collaborators not specifically listed on this concept paper.
☒	I will not post data online or submit the data file to a journal for them to post. *Some journals are now requesting the data file as part of the manuscript submission process. Study participants have not given informed consent for unrestricted open access, so we have a managed-access process. Speak to Temi or Avshalom for strategies for achieving compliance with data-sharing policies of journals.*
☒	I will delete all data files from my computer after the project is complete. Collaborators and trainees may not take a data file away from the office. This data remains the property of the Study and cannot be used for further analyses without an approved concept paper for new analyses.

Signature: 

CONCEPT PAPER RESPONSE FORM

A.

Provisional Paper Title	Cardiovascular reactivity and associations with childhood predictors, psychosocial correlates, and health outcomes: Using data from the Dunedin and MIDUS Studies
Proposing Author	Kyle Bourassa
Other Contributors	Terrie Moffitt, Avshalom Caspi, HonaLee Harrington, Renate Houts, Richie Poulton, Sandhya Ramrakha
Potential Journals	Health psychology journals
Today's Date: 10/30/2019	
Intended Submission Date: Click or tap to enter a date.	

Please keep one copy for your records and return one to the proposing author

B. To be completed by potential co-authors:

☐	Approved
☐	Not Approved
☐	Let's discuss, I have concerns

Comments: Click here to enter text

Please check your contribution(s) for authorship:

☐	Conceptualizing and designing the longitudinal cohort study
☐	Conceptualizing data collection protocols and creating variables
☐	Data collection
☐	Conceptualizing and designing this specific paper project
☐	Statistical analyses and interpretation (or reproducibility check)
☐	Writing
☐	Reviewing manuscript drafts
☐	Final approval before submission for publication
☐	Agreement to be accountable for the work
☐	Acknowledgment only, I will not be a co-author

Signature: Click here to enter text