

Department of Human Science

ABSTRACT

Background: Discrimination may be a chronic stressor linked to accelerated epigenetic aging, a novel DNA-methylation-based measure that predicts morbidity and mortality; however, this has not been tested yet. This study fills this knowledge gap and investigates whether more frequent discrimination is associated with older epigenetic age, and whether this association is exacerbated by racial (vs. non-racial) discrimination.

Methods: We analyzed everyday discrimination frequency and epigenetic age (estimated from the following epigenetic clocks: Horvath, Hannum, GrimAge, PhenoAge, and Dunedin Pace of Aging) for 1,584 participants (ages 50-98, 40% male) from the Health and Retirement Study 2016 wave. Covariates were chronological age, body mass index, sex, and smoking. Unadjusted and adjusted regression models tested the main effect of discrimination frequency on epigenetic age and the interaction with racial discrimination.

Results: In unadjusted models, more frequent discrimination was associated with lower epigenetic age for Horvath (b=-1.8, p=2.01e-07), Hannum (b=-2.2, p<2e-16), PhenoAge (b=-2.14, p<2e-16), and GrimAge (b=-1.85, p<2e-16). In adjusted models, everyday discrimination and epigenetic age were negatively, but non-significantly associated (p's >0.20). Moderation models identified no significant interaction between racial discrimination and frequency on epigenetic aging (p's >0.77).

Conclusion: This study presents a significant negative correlation between discrimination and epigenetic aging in unadjusted models, however, adjusted results were not statistically significant. This lack of association could be explained by the smaller and, on average, younger group reporting frequent discrimination. Future directions include studying multiple discrimination types longitudinally.

MATERIALS AND METHODS

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Participants (N=1584) were from the Health and Retirement Study, a longitudinal panel study of nationally representative adults aged 50 and over. See Table 1 for participant characteristics.

Everyday discrimination frequency and type were measured using a 6-item scale and included items such as poorer service at restaurants, feelings of being threatened, and poorer medical service.

Epigenetic clocks included first-generation clocks trained to predict chronological age and second-generation clocks trained to predict mortality and morbidity. See Table 2 for additional details.

Data analysis Linear regression analyses tested associations between discrimination frequency and type and epigenetic clocks.

Table 2. Epigenetic Clocks							
	Horvath	Hannum	GrimAge	PhenoAge	Dunedin PoAm		
Generation	First	First	Second	Second	Second		
Correlation with Age	0.73	0.82	0.83	0.72	0.06		
Trained to predict	Chronological age	Chronological age	Morbidity, mortality	Smoking, age, sex, mortality	Changes in multi-system biomarkers		

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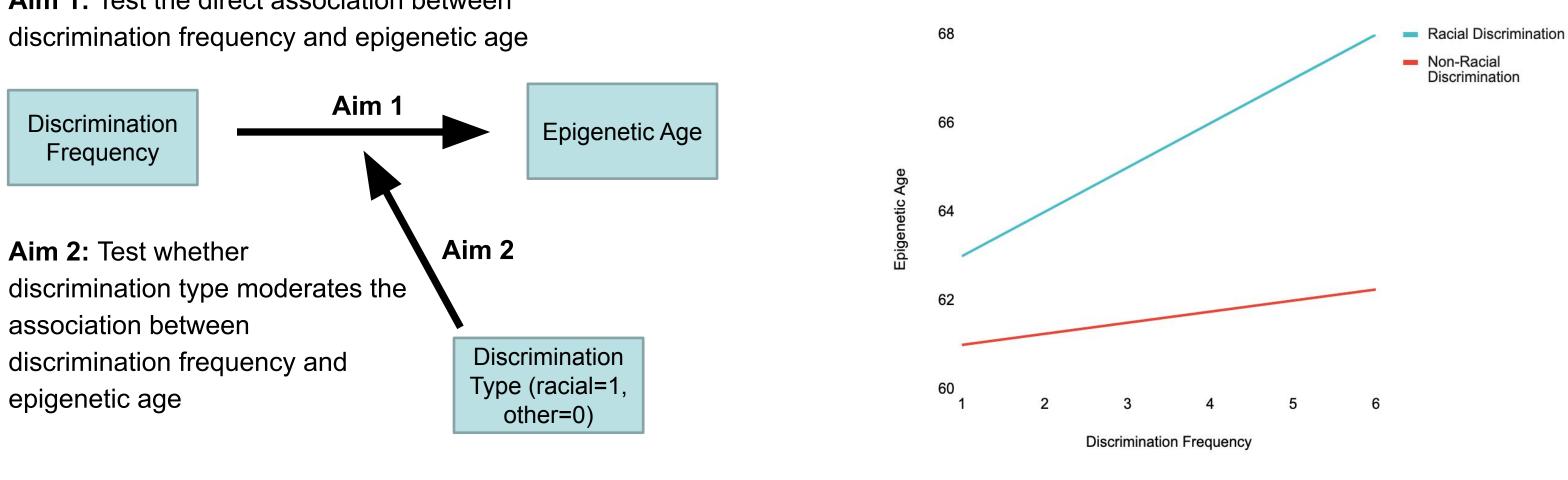
Perceived Racial Discrimination and Epigenetic Aging Roma Dhingra¹, Abby Hillmann², Rebecca Reed, Ph.D.²

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Table 1. Participant Characteristics					
Age*	50-98				
Sex*	40% Male 58% Female 2% Not reported or other				
Race	77.9% White 14.7% Black 7.4% Other				
BMI*	Mean: 28.9 Range: 14.1 - 68				
Smoking Status*	10.2% Currently smoking				
*Covariates	·				

Fig 1. Visual representation of the proposed model

Aim 1: Test the direct association between discrimination frequency and epigenetic age



Results Aim 1: Unadjusted vs adjusted regression models Results Aim 2: The interaction between racial of discrimination on epigenetic age from each clock discrimination and frequency on epigenetic age

	Unac	Adjust		
Clock	b	SE	b	S
Horvath	-1.80*	0.346	-0.033	0
Hannum	-2.21*	0.336	-0.244	0
PhenoAge	-2.15*	0.364	-0.239	0
GrimAge	-1.85*	0.316	-0.035	0
Dunedin PoAm	0.000716	0.00337	0.000227	0

**p*<.05

Summary

- There is a significant negative association between everyday discrimination frequency and epigenetic age in unadjusted models, but there is no significant association in adjusted models.
- The interaction between discrimination frequency and discrimination type is also non-significant.

Future Directions

- Assess 10 years of longitudinal data to determine if persistence of reporting higher discrimination frequency over time influences epigenetic age.
- Assess potential mediation pathways of the association between discrimination and epigenetic age including perceived stress, health behaviors, or negative affect.

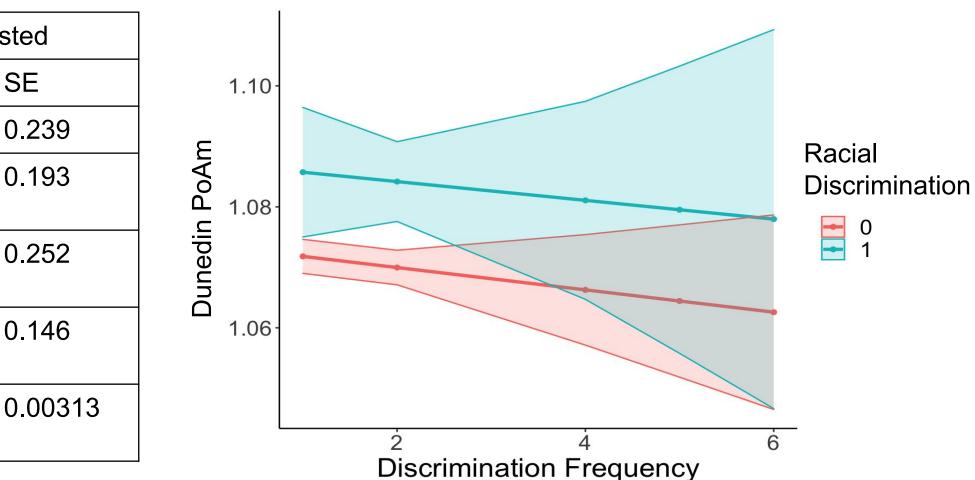
Crimmins, E. M., Thyagarajan, B., Levine, M. E., Weir, D. R., & Faul, J. (2021). Associations of Age, Sex, Race/Ethnicity, and Education With 13 Epigenetic Clocks in a Nationally Representative U.S. Sample McKenna, B. G., Mekawi, Y., Katrinli, S., Carter, S., Stevens, J. S., Powers, A., Smith, A. K., & Michopoulos, V. (2021). When Anger Remains Unspoken.



RESULTS



Fig 2. *Hypothesized results* for interaction between racial discrimination and frequency on epigenetic age



CONCLUSIONS