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Cortisol and politics: Variance in voting behavior is predicted by baseline cortisol levels

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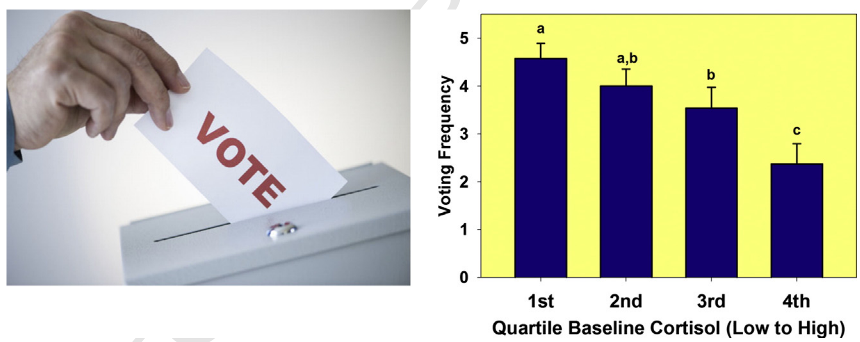
HIGHLIGHTS

- Participation in national elections in U.S. is low: 40–60% of voters participate.
- We measured actual voting behavior and nonvoting political activities.
- Variation in baseline cortisol (CORT) accounts for variance in voting behavior.
- CORT differences do not explain variation in other kinds of political involvement.
- First demonstration that actual electoral participation associated with physiology

GRAPHICAL ABSTRACT



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ABSTRACT

Participation in electoral politics is affected by a host of social and demographic variables, but there is growing evidence that biological predispositions may also play a role in behavior related to political involvement. We examined the role of individual variation in hypothalamic–pituitary–adrenal (HPA) stress axis parameters in explaining differences in self-reported and actual participation in political activities. Self-reported political activity, religious participation, and verified voting activity in U.S. national elections were collected from 105 participants, who were subsequently exposed to a standardized (nonpolitical) psychosocial stressor. We demonstrated that lower baseline salivary cortisol in the late afternoon was significantly associated with increased actual voting frequency in six national elections, but not with self-reported non-voting political activity. Baseline cortisol predicted significant variation in voting behavior above and beyond variation accounted for by traditional demographic variables (particularly age of participant in our sample). Participation in religious activity was weakly (and negatively) associated with baseline cortisol. Our results suggest that HPA-mediated characteristics of social, cognitive, and emotional processes may exert an influence on a trait as complex as voting behavior, and that cortisol is a better predictor of actual voting behavior, as opposed to self-reported political activity.

1. Introduction

Traditional explanations of variation in political temperament and behavior focus on demographics, parental socialization, resources, motivation, and personality, including age, sex, income, education, rational self-interest, altruism, conscientiousness, and openness to new experiences [1–6]. In addition to these demographic and sociocultural factors,

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increasing attention has also been given to the role of genetics [3,4,7,8]. Whatever their original sources, at some point the factors that shape temperament and behavior must operate through biological states, since perception, processing, and responding all entail physiological actions. Physiology is thus a potentially valuable marker for political phenotypes. Despite urgings dating at least to the 4th century B.C. (Aristotle), few studies have systematically examined the physiological correlates of political temperament and behavior.

Research has reported that differences in political ideology (e.g., liberal/conservative; left/right) or differences in salient issue positions (e.g., support or opposition to gay marriage, the death penalty, and illegal immigrants) correlate with brain anatomy [9], brain activation patterns in response to an unexpected stimulus [10], and electrodermal activity in response to negative stimuli [11,12]. Yet, interesting as ideological positions may be, people's political temperaments consist of much more than these traits. Of particular interest here is variation in people's involvement in various aspects of the political process, ranging from contributing time and/or money to political events, campaigns, and other activities to ultimately exercising the vote on election day. In fact, a perennial concern of many modern democracies is insufficient public participation in the political sphere [13]. Progress on this vexing issue requires better understanding of both the short-term and long-term correlates of political participation.

A host of short-term environmental events influence political involvement, including voter-participation campaigns and particularly stimulating or controversial electoral contests [14,15]. However, it is equally clear that these occasional alterations take place against the backdrop of long-term, individual-level consistency. Whether the target variable is political participation [14,16,17], political attitudes [18] or levels of political interest [19] both inter-person variability and intra-person stability are apparent, though the reasons for this stability are not. Conditions and traits, such as age, education, and income [1,20] all correlate positively with political participation and are relatively stable over time but the mechanisms by which they connect to participatory acts are largely unspecified. In a parallel fashion, many physiological traits demonstrate inter-person variability and intra-individual stability [21,22], raising the possibility that there may be value in testing for the correlation of political involvement and physiological measures.

An intriguing potential source of variation in political involvement is individual differences in functioning in the neuroendocrine stress system, the hypothalamic–pituitary–adrenal (HPA) axis. Both basal and stress-reactive components of this axis, assessed by monitoring cortisol (CORT) production, are shaped by multiple factors [23]. A growing list of candidate genes shows polymorphisms that map onto differences in basal CORT levels and CORT reactivity to stressors [24,25], and these and other genes interact with early social and physical environments [26,27] to ultimately determine stress-response styles. It is also well-established that variation in function in the HPA axis is associated with differences in social, emotional/affective, and decision-making processes in both nonclinical [28–30] and clinical [31,32] populations. Given that political participation likely involves a complex combination of psychological factors that are associated with HPA activity, variation in HPA function may be predictive of the relatively stable individual differences in political involvement. Several studies have addressed the *consequences* of political participation on subsequent cortisol levels, demonstrating that cortisol levels are higher on election days than on nonelection days [33], that cortisol levels in supporters of losing candidates are elevated relative to cortisol levels in supporters of winning candidates [34], and that highly politically-partisan participants exhibit elevated cortisol after reading a post-election political essay, relative to reading a nonpolitical text passage [35]. To our knowledge, however, the notion that individual differences in the fundamental operating characteristics of the HPA axis are correlated with, and hence may be *causally* related to variation in the likelihood of engaging in political activity, has not been tested.

We tested the association between HPA function and political involvement in a representatively-selected population of eligible voters. HPA axis function was assessed by exposing participants to a standardized psychosocial stressor (Trier Social Stress Test, TSST): [36,37], and both baseline and stress-reactive components of HPA activity were assessed by measuring levels of salivary cortisol. Political participation was assessed in two ways: (1) self-reported involvement with political matters; and (2) actual records of voting in six national-level elections (primary and general elections of 2006, 2008, and 2010). For comparison purposes, we also measured participants' involvement in a social but nonpolitical organized activity (religious participation). Given that politics by its nature entails conflict and social stress, we expected that baseline and reactive CORT levels would be inversely related to individual-level variations in political involvement.

2. Methods

2.1. Participants and survey instruments

We retained the services of a professional survey research organization to assist in the recruitment of participants. Employees of this organization contacted by phone (a statistically appropriate mix of landlines and cellphones) a random sample of adults within easy driving distance of our laboratory in a medium-sized city in the Midwest United States. Specifically, individuals contacted were asked if they would be willing to report to the lab to complete a comprehensive computer survey of their sociodemographics, political orientations, and personality tendencies, in addition to completing baseline cognitive and physiological tests. We recruited 345 individuals in this fashion. Our sample is not a student-based one, and was reasonably representative of the geographical area from which it was drawn. All procedures with human participants were reviewed and approved by the Institutional Review Board at the University of Nebraska, Lincoln, and all participants provided informed consent prior to participating in any collection of data.

We selected a smaller sample ($n = 105$) from the original sample for evaluation of HPA function. In order to insure representative variation in political ideology in the subsample assessed for HPA function, we used the answers provided in the survey administered during their first visit to the lab to identify participants from the group of 345 who scored highest on three measures of ideology: political conservatism, political liberalism, and political disinterest. Because our primary interests were in accounting for variation in voting behavior and not political ideology or party affiliation, we recruited participants equally from these three groups for the assessment of HPA function, proceeding into the middle of the distributions as necessary. These procedures yielded a subsample similar to the full sample (detailed demographic information on the subsample can be found in Supplemental Information: Table S1).

2.2. Stress protocol

In order to minimize the effects of diurnal variation and to increase participation from our nonstudent population, selected participants reported to the laboratory at one of two testing times in the late afternoon: 1700 or 1800 h. Also, to minimize the effects of seasonal variations in CORT, all testing was done within a two-week period. Participants were asked to refrain from eating or drinking for 2 h prior to reporting for the study. After completing informed consent, participants provided a passive drool saliva sample via a 4 cm length of plastic straw directly into a 1.5 ml microcentrifuge tube: this sample was used to establish baseline CORT (Time = 0 min). All participants were then exposed to a modified TSST procedure for groups [38]. In a context designed to produce social/evaluative stress, groups of participants ($n = 3–8$ per cohort) spent 10 min preparing a speech for a job interview. Props in the experimental room suggested that the speech would be videotaped and participants were told that expert evaluators both present in the room and via remote video connection would evaluate