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Stressful politics: Voters' cortisol responses to the outcome of the 2008 United States Presidential election

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Summary Social subordination can be biologically stressful; when mammals lose dominance contests they have acute increases in the stress hormone cortisol. However, human studies of the effect of dominance contest outcomes on cortisol changes have had inconsistent results. Moreover, human studies have been limited to face-to-face competitions and have heretofore never examined cortisol responses to shifts in political dominance hierarchies. The present study investigated voters' cortisol responses to the outcome of the 2008 United States Presidential election. 183 participants at two research sites (Michigan and North Carolina) provided saliva samples at several time points before and after the announcement of the winner on Election Night. Radioimmunoassay was used to measure levels of cortisol in the saliva samples. In North Carolina, John McCain voters (losers) had increases in post-outcome cortisol levels, whereas Barack Obama voters (winners) had stable post-outcome cortisol levels. The present research provides novel evidence that societal shifts in political dominance can impact biological stress responses in voters whose political party becomes socio-politically subordinate.

Dominance hierarchies are found within every major class of vertebrate taxa (Wilson, 1975), including humans (Tamashiro et al., 2005). Such hierarchical organization results in social ranks that drastically affect the lives of the individuals involved (Sapolsky, 2005). In many species, social subordination can result in a physiological profile associated with a "stress response" — that is, the activation of the hypothalamic—pituitary—adrenal (HPA) axis resulting in elevated levels of glucocorticoids in the bloodstream. In its most extreme form,

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chronic activation of the HPA axis can result in increased likelihood of pathophysiological disease states, suppression of sexual maturation, and dysregulation of affect (Sapolsky et al., 2000).

Elevated glucocorticoids in subordinates can result from several circumstances that afflict lower-ranking individuals. For example, subordinates may have access to fewer resources (Sapolsky, 2005) or experience decreased opportunities for social support (Abbott et al., 2003). One of the most common "stressors" for subordinates is losing a dominance contest (Bhatnagar and Vining, 2003; Koolhaas et al., 1997). Dominance contests are a critical determinant of the leadership of social hierarchies across a wide range of species. In modern human societies, this dominance contest is played out in democratic elections. A democratic election rearranges political parties into dominant and subordinate groups, in which the dominant group gains control of the political machine and holds the greatest power in making legislative decisions. By contrast, the losing, subordinate groups lack the political power to control policy decisions. The losing outcome of a dominance contest is the first stressful experience of subordination. The resulting subordination may be stressful both acutely as well as chronically if the newly formed dominance hierarchy is stable as is the case with party-based shifts in governmental power (Sapolsky, 2005). The present study used the 2008 United States (U.S.) presidential election to determine whether voters supporting the losing candidates experienced a biological stress response as reflected by elevations in cortisol levels after the outcome of the election.

Cortisol is a steroid hormone that has been consistently associated with acute psychosocial stress (Dickerson and Kemeny, 2004; Gunnar et al., 2009). When individuals experience acute and salient stress they have increases in cortisol release. Participants' psychological stress and subsequent cortisol responses are particularly large when the stressor is uncontrollable, unpredictable, and has a social evaluation component (Dickerson and Kemeny, 2004). An election has these critical components for a voter, because the outcome is not in the control of a single voter, the outcome is difficult to forecast, and when one's political party is voted out of office, that is the negative social commentary of the majority of voters (winning party members) on the voters of the losing party.

In humans, we know very little about how winning or losing a dominance competition affects changes in cortisol levels. The most common forms of competition used in such studies were sports competitions, with laboratory studies being more rarely employed (Salvador and Costa, 2009). In the majority of the sports/physical competition studies, the researchers failed to find an effect of winning or losing on changes in cortisol (Booth et al., 1989; Edwards et al., 2006; Filaire et al., 2001; Gonzalez-Bono et al., 1999; Kivlighan et al., 2005; Oliveira et al., 2009; Passelergue and Lac, 1999; Salvador et al., 1987; Serrano et al., 2000). Moreover, in a non-physical, laboratory study that examined contest outcome effects on changes in cortisol using a video game competition paradigm, Mazur et al. (1997) also failed to find an effect of outcome. In another non-physical chess competition paradigm, Hasegawa et al. (2008) also failed to find an effect of winning or losing on changes in cortisol. Among the few studies that have found an outcome effect, there has not been a consistent pattern of cortisol change as a function of winning or losing. Some researchers found that cortisol rose from before to after a sports contest for all participants, but that post-contest cortisol was greater in losers than in winners (Bateup et al., 2002; Filaire et al., 2009). Elias (1981), as well as Suay et al. (1999), found that cortisol increased in all participants in response to a sports competition, but *winners* had higher post-contest cortisol in those studies, which stands in direct contrast to Bateup et al. (2002) and Filaire et al. (2009). Thus, our current knowledge of the effects of dominance contests on humans' changes in cortisol remains murky. The physical contest studies have a large confound, which is that physical exercise drives large increases in cortisol release (Davies and Few, 1973; Sutton et al., 1973). Thus, non-physical contests are better suited to examine win/loss effects on cortisol change, but this study design has heretofore been underemployed. The few non-physical dominance contests that have been staged were ineffective (Hasegawa et al., 2008; Mazur et al., 1997), possibly because a non-physical dominance contest needs to be more salient and engaging to drive changes in cortisol in losing participants.

Unlike previously employed non-physical contests, the U.S. presidential election is a highly salient and engaging "real world" dominance contest for the tens of millions who vote, which makes it ideal for assaying the effect of dominance contest outcomes on cortisol responses in voters. To date, there has been no research testing the effects of dominance contest outcomes on cortisol change at the level of party-based shifts in political dominance. To address this issue, we measured voters' cortisol responses to the outcome of the 2008 U.S. presidential election. We hypothesized that the losing voters would experience increases in cortisol levels after their candidate was declared the official loser.

Additionally, we aimed to test the association between voters' cortisol responses after the election and their endorsement of right-wing authoritarian ideals. If the Democratic candidate won (Barack Obama), we hypothesized that there would be a positive association between cortisol levels and right-wing ideals, whereas if the Republican candidate won (John McCain), we hypothesized that there would be a negative association between cortisol levels and right-wing authoritarian ideals.

1. Methods

1.1. Subjects

Data were collected from 80 participants (27 men) in Durham, NC and from 103 participants (34 men) in Ann Arbor, MI. Eleven Durham participants' data and nine Ann Arbor participants' data were omitted from the analyses, because they did not vote in the election or failed to complete all aspects of the experiment. The final Durham sample ($N = 69$) consisted of 24 men and 45 women (21.07 ± 0.46 years old). The final Ann Arbor sample ($N = 94$) consisted of 33 men and 61 women (21.12 ± 0.49 years old). Three subjects who voted for third-party presidential candidates were excluded from statistical analyses. Subjects were recruited through flyers that were posted throughout the two communities as well as through university subject pools for both course credit and payment. In Ann Arbor, 17 participants voted for McCain and