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The Role of Mesolimbic Circuitry in Buffering Election-Related Distress

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Title: The Role of Mesolimbic Circuitry in Buffering Election-Related Distress

Abbreviated title: Post-Election Distress Moderators

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Abstract:

The 2016 U.S. presidential election yielded distress among many individuals who identify with historically marginalized groups. We used functional magnetic resonance imaging (fMRI) and psychological measures to test the hypotheses that neural response to reward, probing the nucleus accumbens (NAcc) and medial prefrontal cortex (mPFC), and social support would ameliorate the effects of election distress among those who felt negatively affected by the result. Within four months of the 2016 U.S. presidential election, we tested human participants who felt affected by the election result (N = 40, M_{age} = 21.9 years, 28 female) and control participants (N = 20, M_{age} = 20.25 years, 12 female) who did not feel affected by the election result. Election-related distress significantly differed between the groups and distress accounted for over half of the relation between discrimination experiences and depression symptoms among affected individuals. NAcc activation, connectivity between the NAcc and mPFC, and family support moderated the associations between election distress and depression symptoms. Prior work has primarily investigated mesolimbic circuitry in reward and motivation contexts, but our findings extend the relevance of functioning in this circuitry to ameliorating psychological manifestations of acute distress after shifts in political climate. These findings highlight the psychological effects of this important historic event and identify neurobiological and social mechanisms associated with individual differences in response to election distress.

Keywords: depression, distress, election, fMRI, nucleus accumbens, social support

Significance Statement:

The 2016 U.S. presidential election was psychologically distressing for many individuals. In this study, election-related distress was linked to depression symptomology for affected individuals, but not control individuals. However, among individuals distressed by the election, those with greater neural response to reward and higher family support were protected against these depressive symptoms. Previous research has examined how neural response to reward following a discrete event ameliorates clinical symptoms. The current study extends this knowledge by demonstrating that both the brain and social support may play influential roles in dampening affective responses to ongoing and anticipated distress related to political climate. Leveraging this finding to enact interventions that dampen continuous distress, political or otherwise, is a promising endeavor for future research.

The charged rhetoric of the 2016 U.S. presidential campaign left marginalized groups feeling vulnerable and victimized, with many reporting hopelessness, fear, and other symptoms commonly reported by those who have experienced a stressful event (Gold, 2017; Stoler, 2016). In the first 10 days after the election, the Southern Poverty Law Center (SPLC) recorded over 876 hate incidents, the outbreak of which SPLC attributed to the election (SPLC, 2016). According to theories on discrimination (Comas-Díaz, 2016), distress may result from witnessing violence toward one's identity group or experiencing institutional discrimination. Perceived discrimination is linked to a variety of negative health outcomes including depression and psychological distress (Pascoe & Richman, 2009). Even individuals who have not been direct victims of post-election discrimination may have experienced distress through media coverage of hate crimes perpetrated against their identity groups (Gross, 2016; Reeves, 2016). Similarly, prior perceptions of discrimination may relate to the way vulnerable populations experienced these incidents. In contrast, for many the election result did not result in distress. In this study, we used functional magnetic resonance imaging (fMRI) and psychological measures to test differences in response to the election. We tested hypotheses that neural response to reward and social support would ameliorate the effects of election distress among those who felt negatively affected by the result.

Prior work primarily focuses on the role of the mesolimbic neural system, including the nucleus accumbens (NAcc) and medial prefrontal cortex (mPFC), in responding to reward and motivation. However, clinical and animal studies

indicate these neural pathways are vulnerable to stressful experiences (Ferenczi, 2016; Hanson et al., 2016; Trainor, 2011). Greater activation in and stronger connectivity between the mPFC and NAcc have been associated with lower negative psychological symptoms in individuals with major depressive disorder (Furman, Hamilton, & Gotlib, 2011; Young et al., 2016). Dampened mesolimbic responsivity to reward has been linked to individual differences in coping following stressful experiences (Admon et al., 2013; Feder, Nestler, & Charney, 2009; Nikolova et al., 2012). Although this work offers promising advances in understanding how neural circuitry buffers against negative outcomes, it remains unknown whether the election is associated with psychological distress and, if so, whether activity in reward-related neural circuitry is associated with ameliorated negative outcomes. We explore individual differences in neural responsivity as a phenotype of vulnerability to depression following a potentially distressing political event.

Social support is crucial to dampening negative psychological outcomes following stressful events (Panagioti et al., 2014; Schumm, Briggs-Phillips, Hobfoll, 2006). High levels of social support have been associated with positive outcomes following traumatic events (Prati & Pietrantoni, 2009). Oxytocin facilitates social attachment by enhancing the reward value of social stimuli in the brain (Skuse & Gallagher, 2009) and may thus relate to openness to social support. Social support ameliorates negative psychological outcomes by operating on physiological and cognitive coping strategies, thereby enhancing resilience to stress (Charuvastra & Cloitre, 2008; Eisenberger et al., 2007;

Marroquín, 2011; Ozbay et al., 2007). It has yet to be established whether social support can protect against deleterious effects of distressing shifts in political climate.

Within four months of the 2016 U.S. presidential election (November 2016-March 2017), we tested a group of participants who reported feeling personally affected by the election result ("affected" group) and a group of participants who reported not feeling personally affected by the election ("control" group). We hypothesized that (1) the affected group would report greater election-related distress than the control group, (2) more discrimination experiences would relate to greater election distress and depression within the affected group, (3) within the affected group, election distress would relate to depression, and (4) greater neural activation and connectivity in response to reward and (5) greater social support from family and friends would moderate the relation between election distress and depression. We tested both neural activation and social support as moderators, investigating two potential buffers against negative outcomes.

Methods

Participants

Sixty participants were tested after being deemed eligible to participate based on their responses to 3 pre-screening questions: (1) Do you think the result of the 2016 U.S. presidential election will personally affect you?, (2) On a scale of 1 to 7, 1 = *no negative emotional response* and 7 = *an extremely negative emotional response*, how do you feel about the result of the 2016 U.S.

presidential election, and (3) What do you identify as your gender, ethnicity, sexual orientation, religion, and immigration status? We used these pre-screening questions prior to testing to ensure we recruited a heterogeneous sample of participants inclusive of those who felt affected and unaffected by the election result. Prior to testing, participants were assigned to either the affected or control group and recruitment was terminated once the pre-determined group sizes were obtained. Forty participants were assigned to the "affected group" (28 female, M_{Age} =20.25 years, *SD* =2.27, range =18-28 years). Participants were considered "affected" if they met three pre-screening criteria: (1) they indicated they thought they would be personally affected by the election result, (2) they reported an affect rating of 5 or higher, and (3) they reported identifying with at least one historically marginalized group (Table 1). We also obtained free-response explanations of how participants thought they would be personally affected by the election result to ensure our pre-testing categorization as "affected" was accurate (Table 2). One additional affected participant was recruited, but later excluded due to a technical error during scanning. Twenty participants were assigned to the "control group" (12 female, M_{Age} =21.90 years, *SD* =2.83, range =18-30 years). Participants were considered "control" if they met two pre-screening criteria: (1) they indicated they did not think they would be personally affected by the election result, and (2) they reported an affect rating of 4 or lower.

Our primary interest was to determine how individual differences in mesolimbic response to reward and social support buffered distress-related

depression for affected participants. We recruited the control group as a comparison to (1) address that not all individuals felt distressed by the election, (2) demonstrate that election distress among affected participants was linked to depression but that this was not the case for the control group, and (3) assess whether there were underlying differences in the functioning of mesolimbic circuitry between the groups. Thus, we oversampled the affected group to investigate individual differences within that group rather than equally recruiting for both groups, which would have reduced power for within-group analyses.

We did not test a scale inclusive of positive affective responses because testing was conducted in a liberal urban city and conservative-leaning supporters may have experienced discrimination as a result of their political affiliation, conflating potential sources of distress in the two groups. In addition to the pre-screening questions, eligibility criteria included: fluent in English, between the ages of 18-30 years, right handed. Exclusion criteria included: no prior developmental, psychiatric or neurological disorder, no psychotropic medication, not claustrophobic, and no metal in the body.

Experimental Design

Participants completed an MRI scan and self-report measures of election-related distress, everyday discrimination, depression symptoms, and perceived social support from family and friends. Only reports of distress were specifically framed with regard to the 2016 U.S. presidential election. Written consent was obtained in accordance with the university's Institutional Review Board and

participants were compensated for their participation. Testing sessions lasted approximately 1.5 hours.

Self-Report Measures. Participants completed the Impact of Events Scale – Revised (IES-R), a 22-item self-report measure that assesses subjective distress caused by traumatic events (Weiss, 2007). Participants were asked to respond to items on a 5-point scale from 0 (*not at all*) to 4 (*extremely*) indicating for the past seven days how distressing or bothersome each difficulty had been with respect to the 2016 U.S. presidential election (sample items: “I thought about it when I didn’t mean to”, “Reminders of it caused me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart”). Total scores were used in analyses. The maximum possible score was 88.

Participants completed the Everyday Discrimination Scale, a 9-item self-report measure of discrimination experiences (Williams et al., 1997). Participants were asked to respond to items on a scale of 0 (*never*) to 5 (a*lmost every day*) indicating how often each item occurs (sample items: “people act as if they are afraid of you”, “you are called names or insulted”). Discrimination questions were not framed with regard to the election. Total scores were used in analyses. The maximum possible score was 45.

Participants completed the Center for Epidemiologic Studies Depression Scale (CES-D), a 20-item self-report measure that assesses depression symptoms as defined by the American Psychiatric Association Diagnostic and Statistical Manual (DSM-V) (Radloff, 1977). Participants were asked to respond to items on a 4-point scale from 0 (*rarely or none of the time*) to 3 (*most or all of*

197 *the time*) indicating for the past week how often they have felt or behaved in that
198 way (sample items: “I did not feel like eating; my appetite was poor”, “I talked less
199 than usual”). CES-D questions were not framed with regard to the election. Total
200 scores were used in analyses. The maximum possible score was 60.
201 Participants completed the Perceived Social Support (PSS) from Family
202 and Friends Scale, assessing perceived emotional support from family (20 items,
203 PSS-Fa) and friends (20 item, PSS-Fr) (Procidano & Heller, 1983). Participants
204 were asked to respond to items with *Yes*, *No*, *Don’t Know* as to feelings or
205 experiences they identify with (sample items: “My friends/family and I are very
206 open about what we think about things”, “My friends/family give(s) me the moral
207 support I need”). PSS questions were not framed with regard to the election.
208 Total scores were used in analyses. The maximum possible score for each scale
209 was 20.
210 Participants also provided free-response explanations of how they thought
211 they would be affected by the results of the 2016 U.S. presidential election to
212 ensure our categorization as “affected” was accurate from the participant’s point
213 of view. Example responses are listed in Table 2.
214 **fMRI Paradigm.** To probe neural activity in response to reward
215 anticipation and feedback, participants completed a modified version of the
216 Monetary Incentive Delay (MID) task (Knutson et al., 2000) while being scanned
217 with fMRI (Figure 1). The MID task has been widely used to elicit activation in
218 reward circuitry. Participants received spoken and written instructions and then
219 completed a brief practice session outside of the scanner before beginning the

experimental session. During each randomized event-related trial, participants viewed one of four types of monetary cues indicating a combination of incentive valence (gain, loss) and magnitude (large: ±$5.00, small: ±$0.20) or a cue indicating “no money at stake”. Cues took one of three forms: a circle indicated a gain trial, a square indicated a loss trial, and a triangle indicated no money was at stake. Each cue was presented for 2000ms. Cue presentation was modeled as the anticipation phase of the task. Cues were followed by a fixation cross (jittered 1500-4000 ms), after which a target of the same shape as the cue was rapidly presented on the screen (150-500ms). If the participant pressed the button after the target onset but before the target offset, they either gained or avoided losing the cued amount of money. Hit rate was targeted at 60% for each participant by an algorithm that adaptively changed target durations every 3 trials based on past performance. The average reaction time from the practice session plus 2 standard deviations, with a maximum of 500ms, was used at the onset of the task for the purpose of target duration calculation. Feedback indicating the trial outcome was then presented. This feedback presentation was modeled as the feedback phase of the task. Potential trial outcomes were: money gained (gain trials with a correct response), money not gained (gain trials with an incorrect response), money kept (loss trial with a correct response), money lost (loss trial with an incorrect response), no money at stake (no money at stake trials with correct or incorrect response). Ten repetitions of each of the 5 trial types were presented in a randomized order for each individual, summing to a total of 50

trials in each run. Participants completed two functional runs and each run lasted 5.33 minutes.

fMRI Data Acquisition. The scan was conducted on a Siemens Magnetom Prisma MRI scanner with a 32-channel head coil. Parameters for image acquisition were voxel size = 2.4 x 2.4 x 2.4 mm, slices = 60, slice thickness = 2.4 mm, repetition time = 800 ms, echo time = 30 ms, flip angle = 52 degrees, interleaved slice geometry, field of view = 216 mm, 411 volumes. Preprocessing was conducted using FEAT (FMRI Expert Analysis Tool) version 6.00, part of FSL (FMRIB Software Library, www.fmrib.ox.ac.uk/fsl RRID:SCR_002823). Preprocessing consisted of non-brain removal using BET, high-pass filtering (100-s cutoff), and spatial smoothing using a Gaussian kernel of FWHM 5mm. Rigid body motion correction with six degrees of freedom was performed using MCFLIRT. A magnetization-prepared rapid-acquisition gradient echo (MPRAGE) scan was acquired for registration purposes (TR 1900 ms, TE 2.26 ms, FoV 250 mm, slice thickness 1mm, 176 slices per slab). Each participant's functional data were registered to their MPRAGE using boundary based registration (BBR) (Greve & Fischl, 2009) and then to MNI (Montreal Neurological Institute) stereotaxic space with 12 degrees of freedom using FSL's registration method via FLIRT. Alignment was visually confirmed for all participants.

Data Availability. Data, materials, and preregistration documents can be accessed at Open Science Framework.

Statistical Analysis

At the individual level, one general linear model (GLM) was defined for each run of the MID task. The GLM included 10 multiple regressors for each event type: anticipation of gains, anticipation of losses, anticipation of no money at stake, feedback of gains, feedback of losses, feedback of no money at stake, feedback of no money gained, feedback of no money lost, all targets, and all fixation crosses. Magnitude of gains and losses were collapsed. Events were modeled with a canonical (double-gamma) hemodynamic response function for a duration from stimulus onset to stimulus offset. Temporal derivatives were included as covariates of no interest for all regressors, allowing a better fit for the whole model and reducing unexplained noise. Group-level analyses were performed using the FMRIB Local Analysis of Mixed Effects (FLAME-1) module in FSL (Beckmann, Jenkinson, & Smith, 2003). Outliers were de-weighted in the multi-subject statistics using mixture modeling (Woolrich, 2008). Contrasts of interest were anticipation of gains versus losses and feedback of gains versus losses.

Based on previous meta-analytic findings (Knutson & Greer, 2008) and our *a priori* hypotheses, analyses focused on activity in two bilateral brain regions known to be activated in the MID task, the right and left NAcc and mPFC (Figure 2). Consistent with prior work, regions of interest (ROIs) were specified as $8mm^3$ diameter spheres centered on predicted foci derived from the meta-analysis in the Nacc ($x = \pm 10$, $y = 10$, $z = -2$) and mPFC ($x = \pm 5$, $y = 45$, $z = 0$) (Wu et al., 2014). Foci are reported here as Talairach coordinates in conformity with the original meta-analysis and were converted to MNI coordinates using the icbm2tal

transformation prior to analysis. Means of β-coefficients across the voxels of each ROI (bilateral Nacc, bilateral mPFC) were extracted and exported into SPSS (SPSS, Chicago, IL), and then regressed against psychological variables of interest. The bilateral mPFC ROI was used for connectivity analyses. ROI approaches constrain the number of statistical tests, thus reducing probability of Type I error, and provide greater sensitivity for detecting associations with self-report measures.

We also conducted psychophysiological interaction (PPI) analyses (Friston et al., 1997) to examine functional connectivity between the Nacc and mPFC. The standard-space bilateral Nacc mask was transformed to individual functional space using FLIRT, and the average time course of all voxels within the individual's mask were extracted using *fslmeants*. At the individual level, a GLM was defined for each run of the MID task with the same 10 multiple regressors from the ROI analyses. Additionally, the timeseries extracted from the bilateral Nacc mask (physical regressor) was added to each participant's individual-level GLM design matrix as well as the product between the Nacc timeseries (physical regressor) and the task contrast of interest (psychological regressor). The interaction term identified regions that covaried in a task-dependent manner with the Nacc. Two GLMs were defined separately for the contrast of (1) anticipation of gains minus anticipation of losses, and (2) feedback of gains minus feedback of losses. The psychological regressor was zero-centered and the physical regressor was demeaned. Two group-level analyses were performed, one for each contrast, using FLAME-1 in FSL with outliers de-

weighted using mixture modeling. Means of β-coefficients across the voxels of the bilateral mPFC ROI for each subject, representing connectivity between the Nacc and mPFC, were extracted at the group level, exported into SPSS, and then regressed against psychological variables of interest.

To analyze the relation between discrimination, election distress, and depression, mediation (Model 4) was performed using Hayes' PROCESS macro for SPSS (Hayes, 2013). A completely standardized index of mediation (ab_{cs}) was calculated for comparability to direct effects (Preacher & Kelley, 2011). To test the moderating effect of neural activation/connectivity, and social support, moderated mediation (Model 14) was performed. Simple moderation (Model 1) was used to plot significant moderation effects with the low value of the moderator calculated as 1 *SD* below the mean and the high value calculated at 1 *SD* above the mean, consistent with procedures outlined by Aiken and West (1991). Each analysis utilized a bootstrapping approach with 5000 samples, and significance was determined at 95% bias-corrected confidence intervals (95% BC CI). All variables were continuous and centered prior to analysis, and the estimated effects are reported as unstandardized regression coefficients. All analyses control for time from the election to testing. In all analyses, discrimination was the predictor variable, election-related distress was the mediator and depression symptomology was the outcome variable. Nacc activation, Nacc-mPFC connectivity, and perceived social support (PSS-Fa, PSS-Fr) were tested as moderators.

Results

Affected and control participants significantly differed on age $t(58) = 2.44$, $p = 0.018$, $M_{diff} = 1.65$, 95% CI [0.30, 3.00] and political affiliation (0 = Democrat/liberal, 1 = not Democrat/liberal) $t(48) = 5.27$, $p < 0.001$, $M_{diff} = 0.60$, 95% CI [0.37, 0.83], but not on gender (0 = male, 1 = female) $t(58) = -0.77$, $p = 0.45$, ethnicity (0 = Caucasian, 1 = not Caucasian) $t(58) = -1.91$, $p = 0.06$, sexual orientation (0 = straight, 1 = not straight) $t(58) = -1.99$, $p = 0.05$, or religion (0 = Christian/Catholic, 1 = not Christian/Catholic) $t(58) = -.36$, $p = 0.72$ (Table 1). Males and females did not differ on age $t(58) = 0.85$, $p = 0.40$, ethnicity (0 = Caucasian, 1 = not Caucasian) $t(58) = 0.97$, $p = 0.34$, sexual orientation (0 = straight, 1 = not straight) $t(58) = 0.23$, $p = 0.82$, religion (0 = Christian/Catholic, 1 = not Christian/Catholic) $t(58) = -1.47$, $p = 0.15$, or political affiliation (0 = Democrat/liberal, 1 = not Democrat/liberal) $t(48) = 1.65$, $p = 0.11$.

Psychological Outcomes

Descriptive statistics for variables of interest are reported in Table 3. Supporting our first hypothesis, independent samples *t*-test revealed significant differences between the affected ($M = 26.00$) and control ($M = 8.95$) groups with regard to overall election-related distress $t(58) = -4.18$, $p < 0.001$, $M_{diff} = -17.05$, 95%CI [-8.88, -25.22], such that affected individuals reported significantly greater election distress than control individuals. Affected participants reported significantly greater election distress than control participants for each of the intrusion, avoidance, and hyperarousal subscales. Election distress, as measured by the Impact of Events Scale, was not related to pre-screening affect rating demonstrating nuance in the manifestation of distress even among those

who felt similarly negative about the election result. The groups also significantly differed with regard to discrimination $t(58) = -2.30$, $p = 0.025$, $M_{diff} = -4.78$, 95%CI [-8.94, -0.61], such that affected individuals (M=13.18) reported significantly more everyday discrimination than control individuals (M=8.40).

The groups differed as to depression symptoms $t(58) = -2.13$, $p = 0.038$, $M_{diff} = -5.13$, 95%CI [-9.95, -0.30], such that affected individuals (M=12.98) reported significantly greater depressive symptoms than control individuals (M=7.85). Using a recommended cut-off point of ≥ 20 (Vilagut et al., 2016), 1 (0.05%) control individual and 9 (22.5%) affected individuals reported clinical depression. Notably, and supporting our second and third hypotheses, election-related distress and discrimination were significantly correlated with depression symptoms only in the affected group, discrimination and depression $r(40) = .51$, $p = .001$, election distress and depression $r(40) = .63$, $p < .001$ (Table 4).

Discrimination, Election Distress, and Depression

To test whether, in the immediate aftermath of the election, election-related distress would mediate the association between discrimination experiences and depression, we conducted mediation analyses using PROCESS Model 4. Analyses included discrimination as the predictor, election-related distress as the mediator, and depression as the outcome, and controlled for time since the election. For the affected group, results revealed that the indirect effect of discrimination on depression through election distress was significant, $R^2 = .50$, $F(3, 36) = 11.84$, $p < 0.001$; indirect effect 0.28, $SE = .17$, 95% BC CI [0.0538, 0.7702] (Figure 3). The completely standardized index of mediation (ab_{cs}

= 0.21) was 0.21 *SE* = .01, 95% BC CI [0.0545, 0.4376], 51% the size of the remaining direct effect. In other words, over half of the association between discrimination and depression for the affected group was accounted for by election distress. Mediation was not significant in the control group, R^2 = .10, F(3, 16) = 1.34, p = 0.30; indirect effect -0.001, *SE* = .05, 95% BC CI [-0.1248, 0.0993], so we did not test moderation in the control group.

Ventral Striatal Activation and Election-Related Depression

During the MID task, Nacc activation in response to feedback ($M_{affected}$ =11.39; $M_{control}$ = 8.16) did not significantly differ between groups t(58) = -0.15, p = .881, M_{diff} = -3.23, 95%CI [-46.32, 39.85] (Figure 4A). Nacc activation in response to anticipation ($M_{affected}$ = -3.24; $M_{control}$ = 8.32) did not significantly differ between groups t(58) = 1.02, p = 0.310, M_{diff} = 11.57, 95%CI [-11.05, 34.19].

To test our fourth hypothesis that Nacc activation would moderate depression related to election distress, we tested moderated mediation using PROCESS Model 14 in the affected group controlling for time from the election with discrimination as the predictor, election-related distress as the mediator, depression as the outcome, and Nacc activation during anticipation and feedback for the contrast of reward versus loss as moderators. Results revealed moderated mediation was significant for Nacc activation during feedback of reward versus loss R^2 = 0.59, F(5, 34) = 9.96, p < 0.001; index of moderated mediation -0.0033, *SE* = .002, 95% BC CI [-0.0085, -0.0006] (Figure 4B). Nacc activation significantly moderated the association between election distress and depression such that individuals with higher Nacc activation did not show a

significant relation between distress and depression but individuals with average or low Nacc did show a significant relation (Figure 4C). To assess whether this moderation was specific to the association between election distress and depression, we tested whether Nacc activation moderated the association between discrimination and election distress or the association between discrimination and depression and neither of these paths were significant.

Functional Connectivity and Election Distress

We conducted PPI analyses to examine whether functional coupling between the Nacc and mPFC moderated election-related depression for the affected group. Weaker connectivity in this circuitry has been identified as a potential phenotype of vulnerability to long-term negative outcomes following stressful life events (Furman et al., 2011; Salier et al., 2008). Nacc-mPFC connectivity for anticipation of reward versus loss ($M_{affected}$ =0.002; $M_{control}$ =0.03); $t(58) = 0.30$, $p = 0.77$, M_{diff} =0.03, 95%CI [-0.16, 0.22] did not significantly differ between groups (Figure 5A). Nacc-mPFC connectivity for feedback of reward > loss also did not differ between groups ($M_{affected}$ =-0.030; $M_{control}$ =-0.35); $t(58) = -1.41$, $p = 0.16$, M_{diff} =-0.32, 95%CI [-0.78, 0.13].

Confirming our fourth hypothesis, moderated mediation was significant for Nacc-mPFC connectivity during anticipation of reward versus loss $R^2 = 0.58$, $F(5, 34) = 9.58$, $p < 0.001$; index of moderated mediation -0.48, SE = .35, 95% BC CI [-1.2878, -0.0117] (Figure 5B). Greater connectivity between the Nacc and mPFC during anticipation of rewards versus anticipation of losses significantly moderated the association between election distress and depression such that

affected individuals showed a more attenuated relation between distress and depression as connectivity strengthened (Figure 5C). To assess whether this moderation was specific to the association between election distress and depression, we tested whether Nacc-mPFC connectivity moderated the association between discrimination and election distress or the association between discrimination and depression and neither of these paths were significant.

Post-Hoc fMRI Analyses

To disaggregate the contributions of reward and loss, we conducted post-hoc moderation analyses (PROCESS Model 1) using the contrasts of reward versus no money at stake and loss versus no money at stake for both NAcc activation and NAcc-mPFC connectivity. Moderation analyses, controlling for time from the election to testing, indicated that the association between election distress and depression was moderated by NAcc activation during feedback, R^2 = .51, $F(4, 35) = 9.15$, $p < .001$, interaction $B = -0.002$, $t(35) = -2.13$, $p = .04$, and NAcc-mPFC connectivity during anticipation, R^2 = .51, $F(4, 35) = 9.11$, $p < .001$, interaction $B = -0.94$, $t(35) = -2.24$, $p = .03$, for the reward versus no money at stake contrast, but not loss versus no money at stake. Those with greater (+1 SD) NAcc activation during feedback to reward versus no money at stake did not show an association between election distress and depression and those with greater (+1 SD) NAcc-mPFC connectivity during anticipation of reward versus no money at stake showed an attenuated association between election distress and depression. For the loss versus no money at stake contrasts, NAcc activation

was not a significant moderator, R^2 = .47, F(4, 35) = 7.74, p < .001, interaction B = -0.001, t(35) = -1.13, p = .27, nor was NAcc-mPFC connectivity, R^2 = .42, F(4, 35) = 6.27, p < .001, interaction B = 0.06, t(35) = 0.33, p = .74.

Correlational analyses indicated beta values for the feedback (NAcc activation) contrast of reward versus loss were positively correlated with reward versus no money at stake, r(40) = .37, p = .02, and negatively correlated with loss versus no money at stake, r(40) = -.58, p < .001. For the anticipation (NAcc-mPFC connectivity) contrast betas for reward versus loss were positively correlated with reward versus no money at stake, r(40) = .58, p < .001, and (marginally significant) negatively correlated with loss versus no money at stake, r(40) = -.29, p = .07.

Social Support and Election Distress

To test our fifth hypothesis that perceptions of social support would moderate negative outcomes related to election distress, we tested moderated mediation for the affected group with family and friend support as moderators. Perceptions of family support ($M_{affected}$ =13.83; $M_{control}$ =12.60); t(58) = -0.80, p = 0.43, M_{diff} =-1.23, 95%CI [-4.28, 1.83] support did not significantly differ between groups (Figure 6A). Perceptions of friend support ($M_{affected}$ =16.98; $M_{control}$ =14.95); t(58) = -1.62, p = 0.11, M_{diff} =-2.03, 95%CI [-4.53, 0.48] support did not significantly differ between groups. Family support and friend support were significantly correlated in both groups (Table 4). Family support and friend support were not correlated with Nacc activation or Nacc-mPFC connectivity.

Results revealed moderated mediation was not significant. However, simple moderation (PROCESS Model 1) demonstrated that family support significantly moderated the association between election distress and depression, R^2 = .58, $F(4, 35) = 12.14$, $p < .001$; interaction -0.03, SE = .01, $t(35) = -2.33$, $p = .03$ (Figure 6B), such that individuals with higher family support did not show a significant relation between distress and depression, $B = 0.16$, $t(35) = 1.61$, $p = .12$, but individuals with average $B = 0.31$, $t(35) = 4.65$, $p < .001$ or low family support did show a significant relation, $B = 0.46$, $t(35) = 5.67$, $p < .001$ (Figure 6C). Perceptions of friend support did not significantly moderate the association between election distress and depression.

Discussion

The current findings elucidate reactivity of mesolimbic circuitry as an individual difference that explains variance in outcomes following distress related to the 2016 U.S. presidential election. For individuals who felt affected by the election, greater election distress was related to greater depression symptoms, but this association was not present for the control group. Election distress explained 51% of the association between perceived discrimination and depression, and activation and connectivity in frontostriatal circuitry moderated links between election distress and depression, but not discrimination and psychological symptoms in the affected group. Greater activation in the NAcc and stronger connectivity between the NAcc and mPFC were associated with less depression for affected individuals even under conditions of high election-related distress.

494 According to the Center for Disease Control, a traumatic event is when an
495 event causes a lot of stress to the individual (CDC). We did not clinically assess
496 whether the 2016 U.S. presidential election manifested as a trauma for affected
497 individuals. However, our results demonstrated links between election-related
498 distress and depression, which has been commonly identified as psychological
499 problems following trauma (CDC; Schumm et al., 2006). Additionally, we
500 identified activity in neural circuitry related to reward and family support as
501 moderators of these links. These moderators have been identified as sources of
502 resiliency following trauma (Haden et al., 2007; Ozbay et al., 2007). Although
503 political events are not typically characterized as traumatic, many of the concerns
504 expressed by the affected participants in this study (Table 2) are similar to noted
505 hallmarks of trauma (e.g., fear, helplessness). It is important to note that these
506 indicators were only present for the affected group and that the control group
507 evinced significantly less distress in response to the election as well as fewer
508 depression symptoms compared to the affected group.
509 Only 5 (12.5%) of the affected participants in our study reported personally
510 experiencing election-related discrimination following the election (e.g., having
511 people shout “build that wall” at them). However, 32 (80%) of the affected
512 participants reported concern for family, friends, and their community following
513 the election (e.g., Table 2). These data provide evidence that individuals can
514 experience distress and negative psychological outcomes related to witnessing
515 or fearing discrimination against others with whom they identify (Comas-Díaz,
516 2016). Perceptions of everyday discrimination may also influence the way

individuals internalize these vicarious experiences of discrimination against others. Our data suggest that in the immediate aftermath of the election, a large portion of the relation between everyday discrimination experiences and depression was accounted for by election distress. This study expands existing literature to consider shared identity between direct victims and removed members of the same group, and calls for treatment and intervention efforts to include not only those who directly experience discrimination but also those who identify with a targeted group.

The Role of Mesolimbic Circuitry on Election-related Distress

Prior research has shown that that individual differences in the engagement of mesolimbic circuitry contribute to individual differences in psychological outcomes. We extend this research with the observation that this effect is similar following acute distress related to the election in a non-clinical population. What is particularly novel is the knowledge gained about ongoing distress that occurs on a population level across an important epoch in this country's history. For individuals who feel socially and politically marginalized, social support is powerful. By showing that social support and reward systems dampen depressive symptoms, this research highlights two powerful tools that can mitigate election-related distress. Unlike previous research on related questions, the affected individuals in our sample were not only reporting their distress from a past, discrete event but also their ongoing and future distress based on the perception that the event (the election) would personally affect them in the future. Alterations in the functioning of mesolimbic circuitry have been

previously identified as a marker of vulnerability for clinical populations diagnosed with major depressive disorder (Furman et al., 2011; Young et al., 2016). Our data suggests that mesolimbic circuitry may be more protective against depressive symptoms in response to acute (i.e. election-related) versus chronic (i.e. discrimination-related) distress. Prior work on trauma and reward-related activation has not explored prior experiences of ongoing trauma like discrimination to disentangle the potentially distinct role that mesolimbic circuitry has in acute versus chronic trauma/distress. Although the current study is not positioned to definitively do so either, our findings may serve as a launching pad upon which to pursue such questions.

Animal research provides a biological basis for the finding that reactivity in this circuitry has critical effects on behavioral manifestations of stress. Corticotropin releasing factor (CRF) released in response to acute stressors acts on the NAcc to increase dopamine release, resulting in motivational behavior (Peciña, Schulkin, & Berridge, 2006). However, severe stress eliminates this effect such that CRF no longer produces appetitive responses to arousing stimuli (Lemos et al., 2012). This loss in regulation of motivational behavior following stress underlies anhedonia, which is a key symptom in major depressive disorder (APA, 2013; Gorwood, 2008). Similarly, elevated biomarkers of inflammation in patients with major depressive disorder has been linked to decreased connectivity in frontostriatal circuitry, which in turn related to increased anhedonia (Felger et al., 2016).

Social Support Moderates Election Distress and Depression

Perceived support from family also moderated the relation between election distress and negative outcomes, supplementing prior work identifying family support as an important factor in healthy coping following distressing events (Kraaij et al., 2003; Marroquín, 2011; Oliva et al., 2009). Perceived support from friends was not a significant moderator for this sample, potentially identifying a more robust connection between family support and the mental health of young adults (Guassi-Moreira & Telzer, 2015; Mattanah, Lopez, Govern, 2011). It is also possible that shared identity with family calls for greater reliance on family as opposed to friends in times of identity-related discrimination (Mulvaney-Day, Alegría, & Sribney, 2007). Prior animal research indicates neurobiological factors such as oxytocin receptors in the NAcc in facilitating social attachment and reward experiences following positive social interactions (Dölen et al., 2013; Insel & Shapiro,1992). Human neuroimaging studies have also shown greater ventral striatal activation when providing support to a loved-one (Inagaki & Eisenberger, 2012; Telzer et al., 2010). However, indices of social support were not correlated with neural activation or connectivity in this sample, perhaps due to the non-social nature of the task used to elicit NAcc activation in this study. Our findings suggest that neurobiological and social resources may offer two distinct avenues of protection against deleterious psychological outcomes rather than accounting for divergent outcomes in the same resilient individuals. Notably, neural activation and perceptions of social support did not significantly differ for the affected and control groups. Rather than representing indices of pathology, these biological and social factors appear to represent

sources of resilience for individuals experiencing election distress and related negative psychological symptoms.

Limitations and Future Directions

These findings should be considered in light of study limitations. We did not obtain measures of depression symptoms or discrimination experiences prior to the election and thus we could not determine a causal pathway. However, past longitudinal work suggests poor mental health does not predict discrimination perceptions. No participants in this study reported prior diagnoses of psychological disorders, suggesting our results were not influenced by clinical symptoms prior to the election. Although we chose a timeframe of four months post-election to capitalize on the immediate aftermath of the election results, it is possible that this timeframe was too short to manifest between-group neural differences. A longitudinal study is needed to determine whether neural circuitry in affected individuals will demonstrate altered activation in response to continued election-related distress. We identified neural and social contributors of individual differences in psychological outcomes related to distressing events, however election-related distress differed between the groups in our study and not all affected participants reported high distress. Future work should explore mechanisms that may lead to these different affective manifestations of common experiences.

Conclusions

Our findings elucidate pathways through which political events influence well-being, yielding insights into neural mechanisms contributing to individual

609 differences in responses to distressing events in a non-clinical population. We
610 demonstrate resiliency following distressing shifts in political climate for
611 individuals who exhibit robust responsivity in the brain's reward circuitry. Our
612 findings compliment animal research highlighting the vulnerability of the
613 mesolimbic dopamine system to stressful experiences. We also provide empirical
614 evidence of psychological manifestations of distress following shifts in political
615 climate, which has implications for a vast number of individuals.
616

References

Admon R, Lubin G, Rosenblatt JD, Stern O, Kahn I, Assaf M, Hendler T (2013) Imbalanced neural responsivity to risk and reward indicates stress vulnerability in humans. Cereb Cortex 23: 28-35.

Aiken LS, West SG (1991) Multiple regression: Testing and interpreting interactions. Newbury Park, CA: Sage.

(APA) American Psychiatric Association (2013) Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Arlington, VA: American Psychiatric Publishing.

Beckmann CF, Jenkinson M, Smith SM (2003) General multilevel linear modeling for group analysis in fMRI. NeuroImage 20: 1052-1063.

(CDC) Center for Disease Control, Coping with a Traumatic Event. (United States Department of Health and Human Services, Center for Disease Control; https://www.cdc.gov/masstrauma/factsheets/public/coping.pdf).

Charuvastra A, Cloitre M (2008) Social bonds and posttraumatic stress disorder. Annu Rev Psychol 59: 301-328.

Comas-Díaz L (2016) Racial trauma recovery: A race-informed therapeutic approach to racial wounds. The cost of racism for people of color: Contextualizing experiences of discrimination. Cultural, racial, and ethnic psychology book series, (Alvarez AN, Liang CTH, Neville HA eds), pp 249-272. Washington DC: APA.

638 Dölen G, Darvishzadeh A, Huang KW, Malenka, R (2013) Social reward requires
639 coordinated activity of accumbens oxytocin and 5HT. Nature 501: 179-
640 184.
641 Eisenberger NI, Taylor SE, Gable SL, Hilert CJ, Lieberman MD (2007) Neural
642 pathways link social support to attenuated neuroendocrine stress
643 responses. NeuroImage 35: 1601-1612.
644 Feder A, Nestler EJ, Charney DS (2009) Psychobiology and molecular genetics
645 of resilience. Nature 10: 446-457.
646 Felger JC, Li Z, Haroon E., Woolwine BJ, Jung MY, Hu X, Miller AH (2016)
647 Inflammation is associated with decreased functional connectivity within
648 corticostriatal reward circuitry in depression. Mol Psychiatry 21: 1358-1365
649 Ferenczi EA, Zalocusky KA, Liston C, Grosenick L, Warden MR, Amatya D,
650 Katovich K, Mehta H, Patenaude B, Ramakrishnan C, Kalanithi P, Etkin A,
651 Knutson B, Glover GH, Deisseroth K. (2016) Prefrontal cortical regulation
652 of brainwide circuit dynamics and reward-related behavior. Science 351:
653 aac9698.
654 Fingerman KL, Cheng YP, Tighe L, Birditt KS, Zarit S (2012) Relationships
655 between young adults and their parents. Early adulthood in a family
656 context, pp 59-85. New York, NY: Springer.
657 Friston KJ, Buechel C, Fink GR, Morris J, Rolls E, Dolan RJ. (1997)
658 Psychophysiological and modulatory interactions in neuroimaging.
659 NeuroImage 6: 218-229.

660 Furman DJ, Hamilton JP, Gotlib IH (2011) Frontostriatal functional connectivity in
661 major depressive disorder. Biol Mood Anxiety Disord 1: 1-11.
662 Gold J (2017) Post-election stress disorder' strikes on both sides (CNN;
663 http://edition.cnn.com/2017/02/20/health/post-election-stress-partner/).
664 Gorwood P (2008) Neurobiological mechanisms of anhedonia. Dialogues Clin
665 Neurosci 10: 291-299.
666 Greve DN, Fischl B (2009) Accurate and robust brain image alignment using
667 boundary based registration. NeuroImage 48: 63-72.
668 Gross N (2016) Are Americans Experiencing Collective Trauma? (New York
669 Times; https://www.nytimes.com/2016/12/16/opinion/sunday/are-
670 americans-experiencing-collective-trauma.html).
671 Guassi-Moreira JF, Telzer EH (2015) Changes in family cohesion and links to
672 depression during the college transition. J Adolesc 43: 72-82.
673 Haden SC, Scarpa A, Jones RT, Ollendick TH (2007) Posttraumatic stress
674 disorder symptoms and injury: The moderating role of perceived social
675 support and coping for young adults. Pers Individ Dif 42: 1187-1198.
676 Hanson JL, Albert D, Iselin AMR, Carré JM, Dodge KA, Hariri AR (2016)
677 Cumulative stress in childhood is associated with blunted reward-related
678 brain activity in adulthood. Soc Cogn Affect Neurosci 11: 405-412.
679 Hayes AF (2013) Introduction to mediation, moderation, and conditional process
680 analysis. A regression-based approach. New York, NY: Guildford Press.

681 Heinrichs M, Baumgartner T, Kirschbaum C, Ehlert U (2003) Social support and
682 oxytocin interact to suppress cortisol and subjective responses to
683 psychological stress. Biol Psychiatry 54: 1389-1398.
684 Inagaki TK, Eisenberger NI (2012) Neural correlates of giving support to a loved
685 one. Psychosom Med 74: 3-7.
686 Insel TR, Shapiro LE (1992). Oxytocin receptor distribution reflects social
687 organization in monogamous and polygamous voles. Proc Natl Acad Sci
688 89: 5981-5985.
689 King LA, King DW, Leskin GA, Foy DW (1995) The Los Angeles Symptom
690 Checklist: A self-report measure of posttraumatic stress disorder.
691 Assessment 2: 1-17.
692 Kraaij V, Garnefski N, de Wilde EJ, Dijkstra A, Gebhardt W, Maes S, ter Doest L
693 (2003) Negative life events and depressive symptoms in late adolescence:
694 Bonding and cognitive coping as vulnerability factors? *J Youth Adolesc* 32:
695 185-193.
696 Knutson B, Westdorp A, Kaiser E, Hommer D (2000) FMRI visualization of brain
697 activity during a monetary incentive delay task. NeuroImage 12: 20-27.
698 Knutson B, Greer SM (2008) Anticipatory affect: Neural correlates and
699 consequences for choice. Philos Trans R Soc B Biol Sci 363: 3772-3786.
700 Kraaij V, Garnefski N, de Wilde EJ, Dijkstra A, Gebhardt W, Maes S, ter Doest L
701 (2003) Negative life events and depressive symptoms in late adolescence:
702 Bonding and cognitive coping as vulnerability factors? J Youth Adolesc 32:
703 185-193.

704 Lemos JC, Wanat MJ, Smith JS, Reyes BAS, Hollon NG, Van Bockstaele EJ,
705 Chavkin C, Phillips PEM (2012) Severe stress switches CRF action in the
706 nucleus accumbens from appetitive to aversive. Nature 490: 402-406.
707 Marroquín B (2011) Interpersonal emotion regulation as a mechanism of social
708 support in depression. Clin Psychol Rev 31: 1276-1290.
709 Mattanah JF, Lopez FG, Govern JM (2011) The contributions of parental
710 attachment bonds to college student development and adjustment: A
711 meta-analytic review. J Couns Psychol 58: 565-596.
712 Mulvaney-Day NE, Alegría M, Sribney W (2007) Social cohesion, social support,
713 and health among Latinos in the United States. Soc Sci Med 64: 477-495.
714 Nikolova YS, Bogdan R, Brigidi BD, Hariri AR (2012) Ventral striatum reactivity to
715 reward and recent life stress interact to predict positive affect. Biol
716 Psychiatry 72: 157-163.
717 Oliva A, Jiménez JM, Parra Á (2009) Protective effect of supportive family
718 relationships and the influence of stressful life events on adolescent
719 adjustment. Anxiety Stress Coping 22: 137-152.
720 Ozbay F, Johnson DC, Dimoulas E, Morgan III CA, Charney D, Southwick S
721 (2007) Social support and resilience to stress. Psychiatry 4: 35-40.
722 Pascoe EA, Richman LS (2009) Perceived discrimination and health: A meta-
723 analytic review. Psychol Bull 135: 531-554.
724 Panagioti M, Gooding PA, Taylor PJ, Tarrier N (2014) Perceived social support
725 buffers the impact of PTSD symptoms on suicidal behavior: Implications
726 into suicide resilience research. Compr Psychiatry 55: 104-112.

727 Peciña S, Schulkin J, Berridge KC (2006) Nucleus accumbens corticotropin-
728 releasing factor increases cue-triggered motivation for sucrose reward:
729 Paradoxical positive incentive effects in stress? BMC Biol 4: 8.
730 Prati G, Pietrantoni L (2009) Optimism, social support, and coping strategies as
731 factors contributing to posttraumatic growth: A meta-analysis. J Loss
732 Trauma 5: 364-388.
733 Preacher KJ, Kelley K (2011) Effect size measures for mediation models:
734 Quantitative strategies for communicating indirect effects. Psychol
735 Methods 16: 93-115.
736 Procidano M, Heller K (1983) Measures of perceived social support from friends
737 and from family: Three validation studies. Am J Community Psychol 11: 1-
738 24.
739 Radloff LS (1977) The CES-D scale: A self report depression scale for research
740 in the general population. Appl Psychol Meas 1: 385-401.
741 Reeves J (2016) Many minorities frightened of what a Trump presidency means
742 for them (PBS Newshour; http://www.pbs.org/newshour/rundown/many-
743 minorities-frightened-trump-presidency-means/).
744 Salier U, Robinson S, Fischmeister FP, König D, Oppenauer C, Lueger-Schuster
745 B, Moser E, Kryspin-Exner I, Bauer H. (2008) Altered reward processing in
746 the nucleus accumbens and mesial prefrontal cortex of patients with
747 posttraumatic stress disorder. Neuropsychologia 46: 2836-2844.
748 Schumm JA, Briggs-Phillips M, Hobfoll SE, (2006) Cumulative interpersonal
749 traumas and social support as risk and resiliency factors in predicting

PTSD and depression among inner-city women. J Trauma Stress 19: 825-836.

Skuse DH, Gallagher L (2009) Dopaminergic-neuropeptide interactions in the social brain. *Trends Cogn Sci* 13: 27-35.

(SPLC) Southern Poverty Law Center (2016) Ten days after: Harassment and intimidation in the aftermath of the election. (Southern Poverty Law Center; https://www.splcenter.org/sites/default/files/com_hate_incidents_report_final.pdf)

Stoler DR (2016) Post Election Anxiety and Depression. (Psychology Today; https://www.psychologytoday.com/blog/the-resilient-brain/201612/post-election-anxiety-and-depression).

Telzer EH, Masten CL, Berkman ET, Lieberman MD, Fuligni AJ (2010) Gaining while giving: An fMRI study of the rewards of family assistance among White and Latino youth. Soc Neurosci 5: 508-518.

Trainor BC (2011) Stress responses and the mesolimbic dopamine system: Social contexts and sex differences. Horm Behav 60: 457-469.

Vilagut G, Forero CG, Barbaglia G, Alonso J (2016) Screening for depression in the general population with the Center for Epidemiologic Studies Depression (CES-D): A systematic review with meta-analysis. PLoS ONE 11: e0155431.

771 Weiss DS (2007) The Impact of Events Scale-Revised. Assessing Psychological
772 Trauma and PTSD: A Practitioner's Handbook, Second Edition, (Wilson
773 JP, Keane M eds), pp 168-189. New York, NY: Guilford Press.
774 Williams DR, Yu Y, Jackson JS, Anderson NB (1997) Racial differences in
775 physical and mental health: Socioeconomic status, stress, and
776 discrimination. J Health Psychol 2: 335-351.
777 Woolrich M (2008) Robust group analysis using outlier inference. NeuroImage
778 41: 286-301.
779 Wu CC, Samanez-Larkin GR, Katovich K, Knutson B (2014) Affective traits link to
780 reliable neural markers of incentive anticipation. NeuroImage 84: 279-289.
781 Young CB, Chen T, Nusslock R, Keller J, Schatzberg AF, Menon V. (2016)
782 Anhedonia and general distress show dissociable ventromedial prefrontal
783 cortex connectivity in major depressive disorder. Transl Psychiatry 6:
784 e810.
785

Figure Legends

Figure 1. Representative MID task trials. During each trial, participants first saw a cue indicating a potential gain or loss of different amounts (large: ±$5.00, small: ±$0.20) or a cue indicating "no money at stake" (anticipation phase). Next, participants saw a jittered fixation cross as they waited for a rapidly presented target to which they were instructed to respond with a button press. Finally, participants saw the outcome of their action and their success at responding while the target was on the screen.

Figure 2. Bilateral 8mm^3 NAcc ROI (yellow, x = ± 10, y = 10, z = -2) and mPFC ROI (green, x = ± 5, y = 45, z = 0) based on meta-analytic findings (Knutson & Greer, 2008).

Figure 3. Election distress significantly mediated the association between discrimination and depression symptoms for the affected group. Analyses utilized a bootstrapping approach with 5000 samples, and significance was determined at 95% bias-corrected confidence intervals. All variables were continuous and centered prior to analysis, and the estimated effects are reported as unstandardized regression coefficients.

Figure 4. NAcc activation significantly moderated the link between election distress and depression symptoms for affected individuals. Analyses utilized a bootstrapping approach with 5000 samples, and significance was determined at 95% bias-corrected confidence intervals. All variables were continuous and centered prior to analysis, and the estimated effects are reported as unstandardized regression coefficients. (A) Distribution by group of NAcc

activation to Feedback Reward > Loss extracted from the bilateral NAcc ROI (x = ± 10, y = 10, z = -2, 8mm^3 spheres). Neural activation did not differ by group. (B) Significant moderated mediation analysis. Election distress significantly mediated the relation between discrimination and depression symptoms. NAcc activation significantly moderated the link between election distress and depression symptoms for affected individuals. (C) Simple slopes analyses showing that high NAcc activation ameliorated the relation between election distress and depression symptoms for affected individuals.

Figure 5. NAcc-mPFC connectivity significantly moderated links between election distress and depression symptoms for affected individuals. Analyses utilized a bootstrapping approach with 5000 samples, and significance was determined at 95% bias-corrected confidence intervals. All variables were continuous and centered prior to analysis, and the estimated effects are reported as unstandardized regression coefficients. (A) Distribution by group of NAcc-mPFC connectivity to Anticipation of Reward > Loss from the bilateral mPFC ROI (x = ± 5, y = 45, z = 0, 8mm^3 spheres). Neural connectivity did not differ by group. (B) Significant moderated mediation analysis. Election distress significantly mediated the relation between discrimination and depression symptoms. NAcc-mPFC connectivity significantly moderated links between election distress and depression symptoms for affected individuals. (C) Simple slopes analyses showing that high NAcc-mPFC connectivity ameliorated the relation between election distress and depression symptoms for affected individuals.

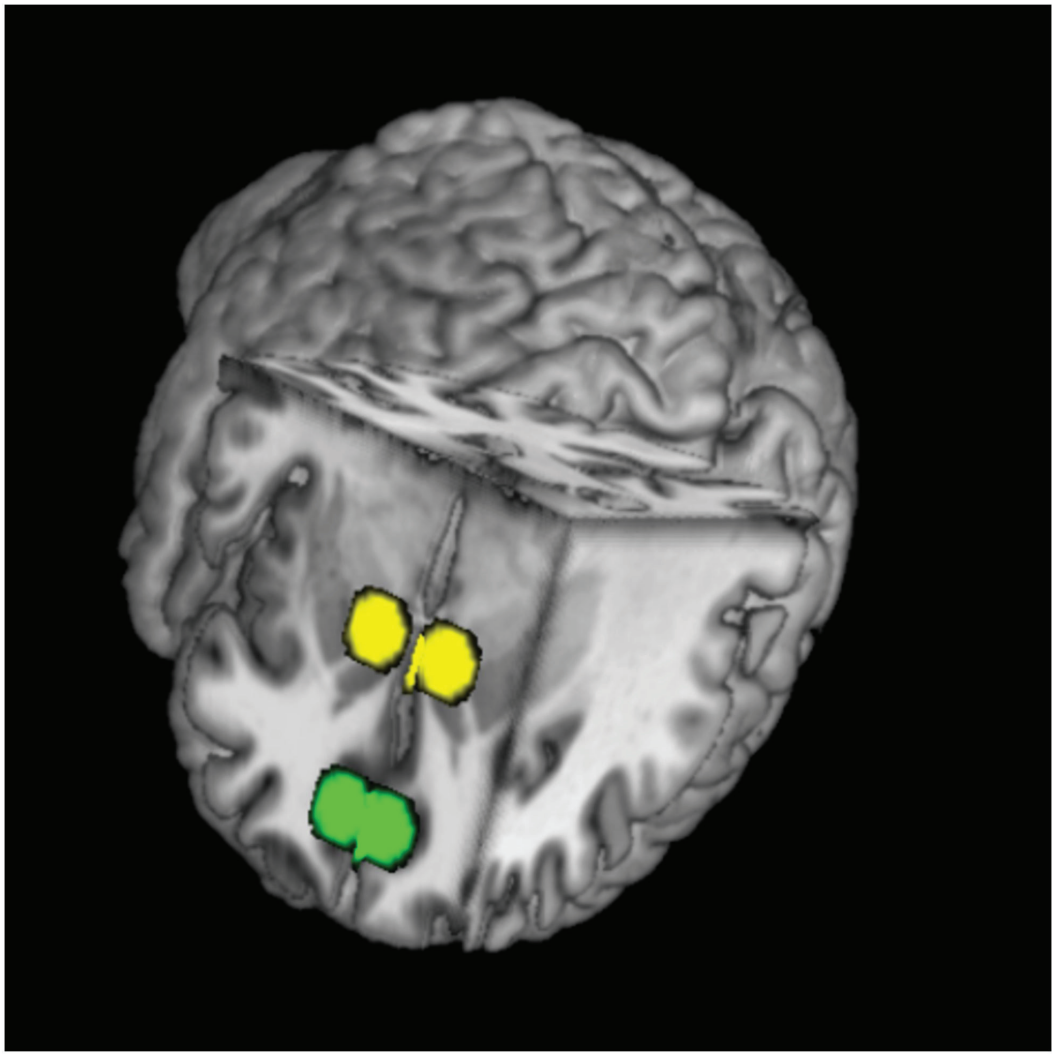
Figure 6. Family support significantly moderated links between election distress and depression symptoms for affected individuals. Analyses utilized a bootstrapping approach with 5000 samples, and significance was determined at 95% bias-corrected confidence intervals. All variables were continuous and centered prior to analysis, and the estimated effects are reported as unstandardized regression coefficients. (A) Distribution by group of family support. Family support did not differ by group. (B) Significant moderation analysis. Family support significantly moderated links between election distress and depression symptoms for affected individuals. (C) Simple slopes analyses showing that high family support ameliorated the relation between election distress and depression symptoms for affected individuals.

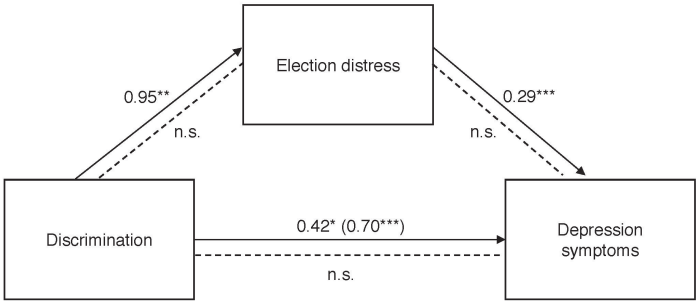
Large gain trial with correct response

Anticipation | Fixation cross | Target | Feedback

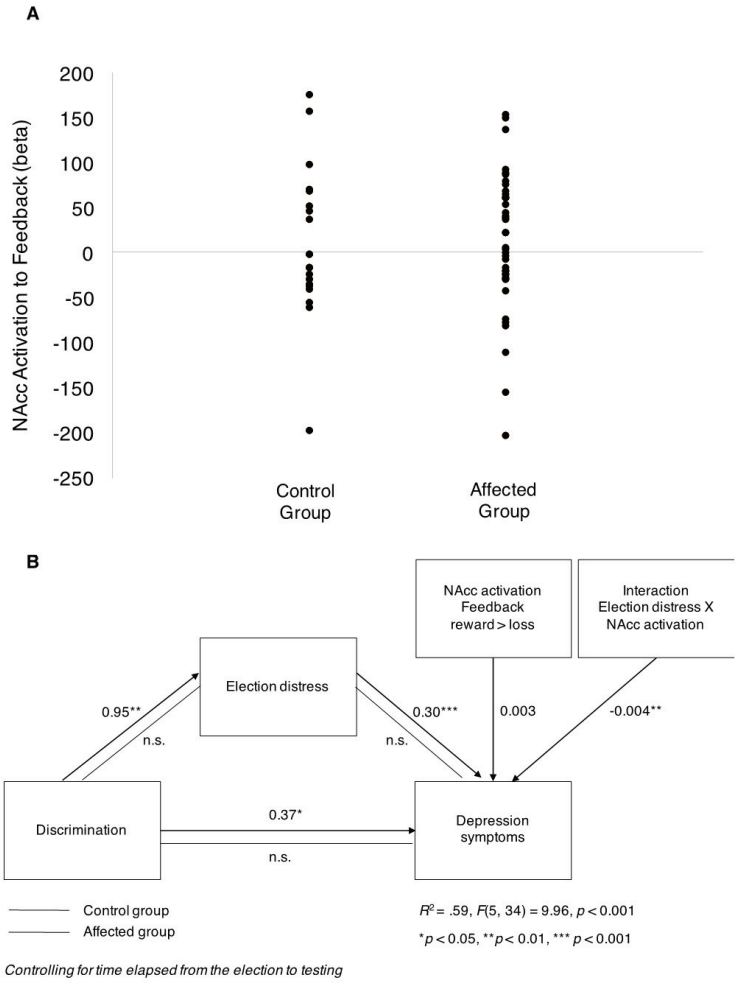
Small loss trial with incorrect response

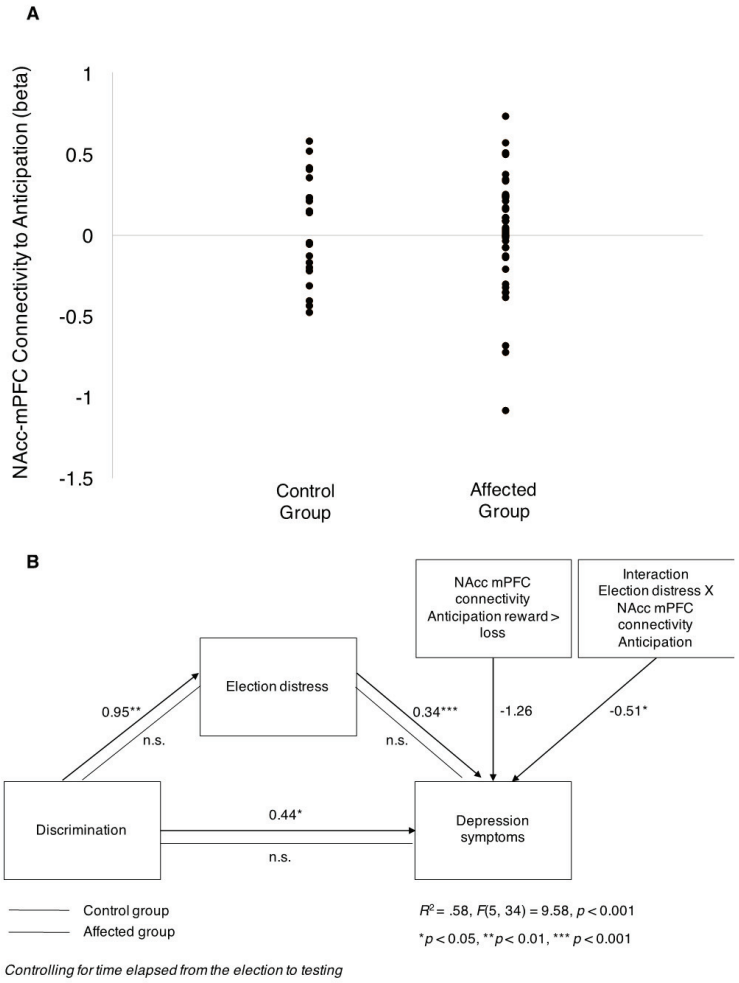
Anticipation | Fixation cross | Target | Feedback

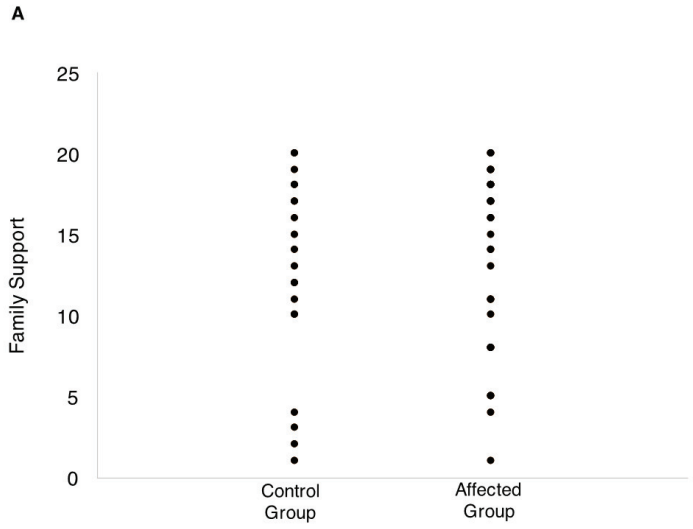


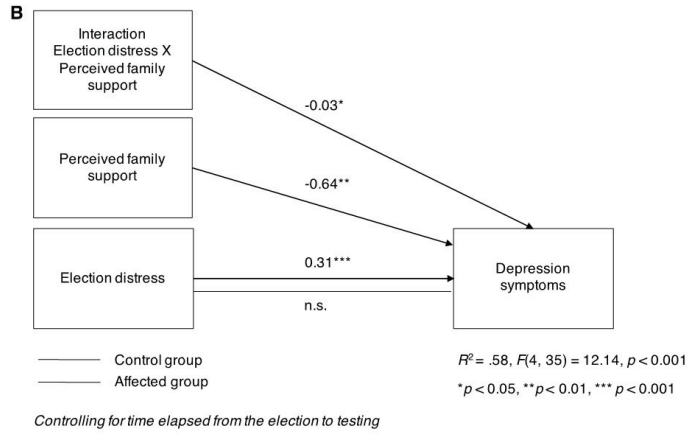


Controlling for time elapsed from the election to testing









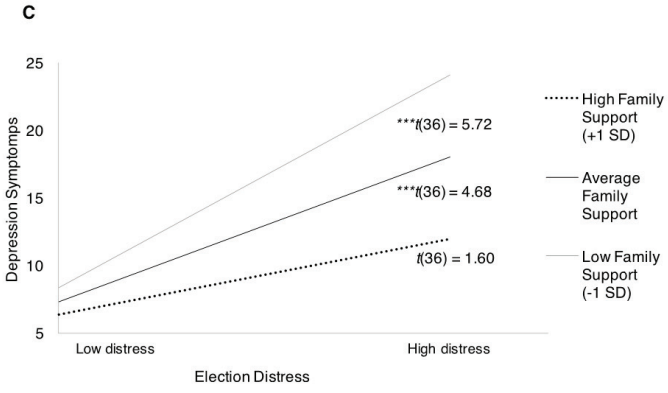


Table 1A. Demographics for the full sample (*N* = 60).

Age (years)	% of Sample	Gender	% of Sample	Ethnicity	% of Sample	Sexual Orientation	% of Sample	Religion	% of Sample	Political Affiliation	% of Sample
18	15.0	Female	66.7	Asian	30.0	Straight	81.7	Catholic	25.0	Democrat	46.7
19	15.0	Male	33.3	Hispanic/Latino	26.7	Bisexual	8.3	Christian	23.3	Republican	3.3
20	31.7			Caucasian	21.7	Gay	3.3	Agnostic	20.0	Independent	8.3
21	6.7			African American	15.0	Queer	5.0	Atheist	16.7	Libertarian	1.7
22	16.7			Middle Eastern	6.7	A-sexual	1.7	Hindu	3.3	Liberal	8.3
23	3.3							Islam	3.3	Conservative	1.7
24	3.3							Buddhist	1.7	None	13.3
25	1.7							Other	6.7	No response	16.7
26	1.7										
28	3.3										
30	1.7										

Table 1B. Demographics for the control group (*N* = 20).

Age (years)	% of Sample	Gender	% of Sample	Ethnicity	%of Sample	Sexual Orientation	% of Sample	Religion	% of Sample	Political Affiliation	% of Sample
18	5.0	Female	60.0	Asian	45.0	Straight	95.0	Catholic	20.0	Democrat	10.0
19	15.0	Male	40.0	Hispanic/Latino	10.0	Bisexual	5.0	Christian	35.0	Republican	10.0
20	15.0			Caucasian	35.0	Gay	0.0	Agnostic	15.0	Independent	15.0
21	10.0			African American	5.0	Queer	0.0	Atheist	15.0	Libertarian	5.0
22	25.0			Middle Eastern	5.0	A-sexual	0.0	Hindu	5.0	Liberal	15.0
23	10.0							Islam	0.0	Conservative	5.0
24	5.0							Buddhist	0.0	None	30.0
25	5.0							Other	10.0	No response	10.0
26	5.0										
30	5.0										

Table 1C. Demographics for the affected group (*N* = 40).

18	20.0	Female	70.0	Asian	22.5	Straight	75.0	Catholic	27.5	Democrat	65.0
19	15.0	Male	30.0	Hispanic/Latino	35.0	Bisexual	10.0	Christian	17.5	Independent	5.0
20	40.0			Caucasian	15.0	Gay	5.0	Agnostic	22.5	Liberal	5.0
21	5.0			African American	20.0	Queer	7.5	Atheist	17.5	None	5.0
22	12.5			Middle Eastern	7.5	A-sexual	2.5	Hindu	2.5	No response	20.0
24	2.5							Islam	5.0		
28	5.0							Buddhist	2.5		
								Other	5.0		

Table 2. Sample free-response explanations of how affected participants felt they would be affected by the 2016 U.S. presidential election.

Affected Participant Explanations	I feel that people that have historically discriminated against minorities like me will feel safe in openly displaying their prejudice towards me and others. I think I will be personally affected because I believe this president will only spread more racism and hate towards my people. I will be mistreated in certain areas. Since I am gay I feel like hateful people will feel emboldened to discriminate against me. Many of my family members are scared they will be deported. The overall social climate around me seems to have become more negative especially when it comes to immigration and equal rights. Although nothing racist has happened yet to me, I feel like the likelihood of something happening will increase these coming years. As a person of color, I feel that this election has emboldened many to disregard, discriminate, and deny the experiences and realities of people like me. I fear for my life and my family's and my friends and friends' families lives. My girlfriend and her family is undocumented and I fear that the results of the US Presidential Election will affect that status. As a Hispanic, I feel targeted as a minority by people who do not like my race. My mother is undocumented and I have disabled relatives that rely on the Affordable Care Act that Trump is repealing and I fear that my mom is going to be deported or experience more overt racism because she's undocumented. As a woman, I feel that certain rights, such as the right to reproductive care, are being threatened. I am also the daughter of an immigrant and have had experience being racially profiled and feel that these events will only increase along the duration of Trump's presidency. I am an African American woman so this election will affect laws not only for my health rights but also create even more tension for minorities in everyday life. With all that has happened lately, in regards to the "muslim ban", I believe that legislation will be passed that enforces stronger immigration laws. Ultimately, I can see both of my parents being deported. This worries me a lot.

Note: All explanations are reproduced verbatim.

Table 3. Descriptive statistics by group ($N_{control}$ = 20, $N_{affected}$ = 40).

	Control	**Affected**
	M(*SD*)	
Election affect	2.70(1.17)	6.23(.80)
Range	*1-4*	*5-7*
Skew(SE)	*-.21*	*-.44*
Election distress	8.95(8.53)	26.00(17.17)
Range	*0-28*	*3-77*
Skew(SE)	*1.24(.51)*	*1.32(.37)*
Discrimination	8.40(7.24)	13.18(7.76)
Range	*0-29*	*2-33*
Skew(SE)	*1.29(.51)*	*.69(.37)*
Depression symptoms	7.85(4.93)	12.98(10.17)
Range	*1-20*	*0-50*
Skew(SE)	*1.12(.51)*	*1.48(.37)*
PSS-Family	12.60(6.06)	13.83(5.32)
Range	*1-20*	*1-20*
Skew(SE)	*-.71(.51)*	*-.77(.37)*
PSS-Friends	14.95(5.75)	16.98(3.87)
Range	*3-20*	*7-20*
Skew(SE)	*-1.19(.51)*	*-1.45(.37)*

Table 4A. Bivariate correlations for the affected group (*N* = 40).

	1	2	3	4	5	6	7
1. Age	—						
2. Election affect	-.36*	—					
3. Election distress	-.07	.26	—				
4. Discrimination	.02	-.002	.43**	—			
5. Depression symptoms	-.11	.36*	.63***	.51**	—		
6. PSS-Family	.10	.05	-.13	-.33*	-.42**	—	
7. PSS-Friends	.13	-.27	.05	-.06	-.26	.39*	—

Note: *p <0.05, **p <0.01, ***p <0.001

Table 4B. Bivariate correlations for the control group (*N* = 20).

	1	2	3	4	5	6	7
1. Age	—						
2. Election affect	-.41	—					
3. Election distress	.00	.36	—				
4. Discrimination	.36	-.36	-.02	—			
5 Depression symptoms	.35	-.23	.14	.41	—		
6. PSS-Family	-.65**	.40	.03	-.46*	-.32	—	
7. PSS-Friends	-.58**	.22	-.18	-.63**	-.57**	-.68**	—

Note: *p <0.05, **p <0.01, ***p <0.001