Personality States of the Union

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Fluctuations in the average daily personality of the United States capture both meaningful affective responses to world events (e.g., changes in anxiety or well-being) and broader psychological responses. We estimate the change in national personality in the months following the onset of the COVID-19 pandemic and investigate fluctuations in personality states during the year 2020 using data from an ongoing personality assessment project. We find significant and meaningful change in personality traits since the beginning of the pandemic, as well as evidence of instability in personality states. When evaluating changes from the first few months of 2020 to the period of social distancing related to COVID-19 restrictions, the social traits reflected an unexpected "deprivation" effect such that mean self-ratings increased in the wake of restricted opportunities for social interaction. Changes in mean levels of the affective traits were not significant over the same months, but they did differ significantly from the average levels of prior years when looking at shorter time intervals (rolling 7-day averages) around prominent national events. This instability may reflect meaningful fluctuations in national personality, as we find that daily personality states are associated with other indices of national health, including daily COVID-19 cases and the S&P index. Overall, the use of personality measures to capture responses to global events offers a more holistic picture of the U.S. psyche and of personality change at the national level.

Substantial prior work has documented that personality traits differ across geographic regions (Allik & McCrae, 2004; McCrae & Terracciano, 2005; Schmitt et al., 2007; Wei et al., 2017) and that such differences are associated with important psychological (Steel & Ones, 2002), economic (de Vries et al., 2011; Kirkcaldy et al., 1998), political (Barceló, 2017; Connelly & Ones, 2008; Rentfrow et al., 2009), and health outcomes (McCann, 2010; Rentfrow et al., 2013). National traits, for example, are associated with GDP and subjective well-being (Kirkcaldy et al., 1998), while state-level traits predict income inequality (de Vries et al., 2011) and voting patterns (Rentfrow et al., 2009). The relationships between personality and outcomes at the state- and country-level are often stronger than similar relationships at the person-level (Steel & Ones, 2002), suggesting that regional and national personality contains important information for policy-makers.

To date, the study of national personality has occurred in the context of cross-cultural research, in which trait levels and outcomes are compared between-countries. However, just as personality is known to change and fluctuate within a single person (Caspi et al., 2005; Fleeson & Jayawickreme, 2015), we might also expect changes and fluctuations in personality within countries over time. The potential for change in personality at the level of nations poses serious consequences for the long-term outcomes of countries. However, personality change at the nation-level has remained largely unstudied because such change either happens slowly over time (requiring continuous assessment across decades) or in the face of a strong and sudden situation that greatly affects a large proportion of the population.

But the COVID-19 pandemic created a quasi-experimental condition, during which we have reason to suspect the personality of the United States has changed. Moreover, the year 2020 included multiple major news events and situations which may have also contributed to noticeable changes in national personality. Importantly, even if national personality is stable in the long-term, short-term fluctuations in some traits could prove to have measurable impact on the psychological and physical health of the nation.

To illustrate the notions of personality change and fluctuation in the context of the pandemic, we describe the example of trait Sociability. If a person, Peter, wanted to change his level of Sociability, he would be advised that trait change is possible, if difficult, through changes in daily-life processes (Quintus et al., 2020; Wrzus & Roberts, 2017) and that he should target behaviors related to Sociability (Stieger et al., 2020). For example, Peter might start work-

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ing in cafes instead of solo-occupant offices, or plan more frequent social outings with groups. If Peter were able to change his daily habits for long enough, he may begin to experience more durable and less intentional increases in his trait Sociability. Scaling this process up to change the personality of a nation would require consistent change in daily processes for many citizens of a country. Millions of Americans would need to engage in new daily behaviors in more or less the same direction, simultaneously. Under normal circumstances, it would be unlikely for the personalities of countries, or other large groups, to change substantially in a short period of time (Elleman et al., 2018; Rentfrow et al., 2008, 2013).

Even so, short-term changes or fluctuations in the personality states of nations may have import. In March and April of 2020, public health officials called for American citizens to "flatten the curve," or slow the rate of spread of the coronavirus, through the use of social distancing (Matrajt & Leung, 2020; Thunström et al., 2020). In essence, the call was for Americans to engage in active, if short-term, personality change: reduce Sociability for a period of 2-3 weeks in an effort to measurably reduce viral spread and maintain public health. Again, we note here the distinction between lasting long-term change in personality and fluctuations in personality states. We do not claim that engagement in social distancing is a form of long-term personality change, nor is there currently evidence that the personalities of individuals changed in consistent ways during the first weeks of the pandemic (Sutin et al., 2020).

Yet personality states reflect both affective fluctuations and situation-specific behaviors (Wilson et al., 2017) and provide meaningful insight into the psychological experience of individuals. Fluctuations in personality at the national level likely hold information relevant to more transitory concerns of a country, especially with regard to less stable outcomes, such as some economic indicators or, during a pandemic, public health and well-being. Early work points to increases in loneliness and decreases in well-being during the first months of the pandemic (Gubler et al., 2020; Zacher & Rudolph, 2020); based on these findings, changes to other personality states also seemed likely.

We note that change in nation-level personality may result from multiple situations. As described above, an unusual situation affecting most or all persons in a country would be one example. Another example would be a situation that has a large effect on a subset of the population. With that in mind, consider the potential for personality change following the killing of George Floyd, the Black Lives Matter protests, the lead-up to the national election, and the sitting president's refusal to concede the election. Regardless of political orientation, one would concede that such events were highly emotional and potentially disruptive for at least a subset of the US population, and thus may precipitate short-term fluctuations in national personality.

Fluctuations in personality traits may be assessed through the application of indices originally developed for research on affective dynamics (Marwaha et al., 2014; Ong & Ram, 2016). These indices – marking the variability, instability, and inertia of psychological states – have been applied at the person-level to understand manifestations of personality disorders (Wright & Simms, 2016) and other

pathologies. Recent focus on intraindividual personality suggests that the assessments of state dynamics can better characterize persons than trait levels (Danvers et al., 2020; Sosnowska et al., 2019).

The current study assesses (1) the degree of personality change in the United States after the pandemic began, (2) the fluctuations in personality states during 2020, and (3) the extent to which fluctuations in states are meaningful, as defined by their associations with other indices of national health, both physical (COVID-19 cases) and financial (S&P closing prices). To answer these questions, we use data (N = 40,887) collected through the SAPA-Project (Condon et al., 2017; Condon & Revelle, 2015), an ongoing personality assessment platform that collects data on thousands of personality items continuously. Such ongoing data collection allows for assessment of change without reliance on retrospective reports. Though the data collected through the SAPA-Project are cross-sectional, there is considerable precedent in psychological research for using large-scale cross-sectional data sets to estimate *normative* longitudinal trends in personality change (Roberts & Mroczek, 2008; Soto et al., 2011).

Methods
Data collection and participants

Personality data was collected as part of the Synthetic Aperture Personality Assessment (SAPA) project, an international online personality assessment tool (Condon & Revelle, 2015). Participants were motivated to complete the survey in exchange for customized feedback about their personality. Participants could answer as many questions as they chose, from 25 to 250 personality questions; more feedback was given to participants who answered more questions. Responding was also optional for all demographic prompts except age, gender, and a question asking whether participants had previously completed the survey. This data collection protocol was approved by the University of Oregon Institutional Review board to have Exempt Status, including informed consent. All methods were carried out in accordance with guidelines and regulations. Participant data for this sample were collected between the dates of January 1 and December 31, 2020 (inclusive). Participants were included in these analyses if they reported residing in the United States (N = 40,887).

Participants (67% female) ranged from 13- to 90-years-old (M = 25.29, SD = 11.34). Participants are generally healthy, with 61% (N = 23,981) of those responding to a single item rating of self-reported health as very good or excellent. Of those who reported employment status (84%), the majority were either currently employed (45%; N = 15,391) or a student (39%; N = 13,373).

Measures

Personality was assessed using the hierarchical SAPA Personality Inventory (SPI-135) (Condon, 2017), which allowed us to calculate scores on both the Big Five traits as well as 27 narrow, unidimensional traits. The Big Five are widely used for the assessment of personality though often criticized for being overly-broad (Condon et al., 2021; Mõttus

et al., 2020), whereas the assessment of more narrow traits, including Sociability, can paint a more nuanced picture of the ways in which personality is (or is not) changing and fluctuating in the United States during the COVID-19 pandemic. While this measure can be scored to generate estimates for each of the broad Big Five traits and 27 narrow traits, we pre-registered our analyses for this study to focus on the Big Five trait of Neuroticism and the five narrow traits most highly correlated with Neuroticism: Adaptability, Anxiety, Emotional Stability, Irritability, and Well Being. As with other hierarchical frameworks for measuring personality, the scores within each level of the hierarchy are independent and the scores across levels of the hierarchy are somewhat dependent. In other words, some of the questions used to derive Neuroticism estimates (at the level of the broad Big Five dimensions) are also used for one (but not more than one) of the narrow 27 traits lower down in the hierarchy.

Each person's Big Five trait scores were calculated by taking the average response to the 14 items in each trait scale (α_N = 0.90; α_E = 0.88; α_A = 85; α_C = 0.86; α_O = 0.80). Because the narrow traits are unidimensional, we used IRT-scoring to estimate person scores on those traits, providing more precise estimates than a traditional sum score approach. Reliability for IRT-scored scales is best conveyed through test information curves as shown in Figures S1-5 (see osf.io/6anw7). Cronbach's alphas are not typically appropriate in this case, but we note that they ranged from a low of .66 (Easy-Goingness) to a high of .90 (Well Being). All trait measures were T-scored (scaled to a mean of 50 and a standard deviation of 10) for ease of interpretation.

We estimate national personality at the daily level by aggregating responses from all participants who provided data on a given day ($N_{\text{per day}}$ ranged from 18 to 282, with an average of 111.14). In addition, we weighted responses by participant characteristics – age, gender, race, and education – using raked weights (Lu & Gelman, 2003) derived using U.S. Census data, in an effort to maximize sample similarity across days and also better represent the population of the nation. In order to reduce systematic variance due to biased participation by time (e.g., perhaps introverts are more likely to participate on weekends), we calculated a seven-day smoothed average, thereby eliminating day-of-week effects.

We also included *daily indices* of the country's physical and financial health. Here, we report analyses using the S&P 500 closing price and daily COVID-19 cases, as reported by *The New York Times*. We also examined the correlations of personality states with daily deaths from COVID-19, 10-year treasury bond rates, and stock market volatility (VIX); these results were similar to what is presented here, and corresponding figures can be found in the Supplemental Materials (Figures S6-8).

These analyses were pre-registered (osf.io/ypbfn) and hypotheses were specified for affective traits (i.e., Neuroticism and related narrow traits). We note here that the pre-registration was for data collected through June 1. Given the time required to complete the analyses, we chose to extend correlation analyses through December, so as to estimate more generalizable and timely effect sizes. In a prior iteration of these analyses, trait Sociability was also strongly associated with both indices discussed herein, while Conscientiousness was unrelated.

Results

Changes in personality traits

To assess the degree to which national personality has changed during the COVID-19 pandemic, we compared personality in the months following the declaration of the national emergency (March 13-June 1, 2020) to personality in the months preceding the declaration (January 1-March 12, 2020). Change in personality traits from before to after the national emergency declaration are shown in Figure 1. After March 13, we see increases in Extraversion and related narrow traits, including Humor, Sociability, Sensation Seeking, and Attention Seeking. Such change is surprising, as this suggests that scores for social traits *increased*, on average, in the sample under social distancing and lockdown orders. Though the underlying mechanism is unclear given the cross-sectional nature of these data, it is unlikely that changes in these traits reflect changes in daily behaviors, as the opportunities for socializing and pursuing sensation- and attention-seeking behaviors were more limited than usual. Alternative explanations follow directly from the deprivation of these opportunities. Perhaps the lockdown prompted higher rates of participation from more extraverted individuals, or the deprivation of lockdown changed respondents' self-appraisals, on average, with respect to the restricted behaviors. Notable increases in Compassion and Art Appreciation support the latter interpretation more than the former, as these were also affected by lockdown restrictions (e.g., going to museums, believing in the importance of art) and fear of contagion (e.g., concern about others, sympathy for those who are worse off). In other words, we may not think of ourselves as extraverts and art aficionados until we are prohibited from social gatherings and cultural events. We also note observed decreases in Emotional Stability (e.g., feeling overwhelmed by emotions, strong changes in mood) and Authoritarianism (e.g., respecting authority, following rules).

To account for the possibility that these changes may be subject to seasonal fluctuation independent of the national emergency, we computed the amount of change across the same period in 2019 (i.e., change in average daily personality from January 1, 2019 through March 12, 2019 and March 13, 2019 to June 1, 2019) and 2018 (change from January 1-March 12 to March 13-June 1), as well as the difference in change. These results are depicted in Supplementary Material Figures S12-13. We found little evidence of national personality trait change in the equivalent time period in 2019; after adjusting for multiple comparisons, only two of 32 traits (Introspection and Attention Seeking) were significantly different in the spring 2019 compared to winter 2019. However, six trait change estimates were significant in 2018. (Eight were significant in 2020.) We note that traits which changed in 2018 were largely different from those that changed in 2020 (Agreeableness, Orderliness, Intellect, and Trust decreased, while Impulsivity increased). Common to both years, Emotional Stability decreased from Winter to Spring. Moreover, comparisons of trait change using standardized effect sizes suggest that change during 2020 for

traits Extraversion (*d* = 0.93), Humor (*d* = 1.22), and Sociability (*d* = 0.83) – as well as Art Appreciation (*d* = 1.07) – were quite large by comparison to 2018. Overall, these analyses suggest that daily national personality levels did change after the declaration of the national emergency, and that these changes were not merely expected seasonal changes.

Change analyses yielded two surprising results: (1) increases in social traits, discussed above, and (2) a lack of change in trait Neuroticism and related narrow traits, including Anxiety and Well-Being (the exception being decreases in Emotional Stability). Given the focus on mental health during social distancing, the lack of change in these traits was unexpected and suggested that the use of two time-points for change analyses poorly represents the real-world processes of change. Perhaps levels of Anxiety and Neuroticism increase just before and/or after the start of the national emergency, but as American citizens become accustomed to their new daily lives, these traits return to baseline. Or perhaps various large-scale events push and pull these traits in different directions. Rising case counts, for example, may lead to increases in anxiety, while federal stimulus bills lead to decreases. In other words, while there may not be significant overall differences between winter and spring, we may see significant fluctuations in traits in the year 2020. Expanding beyond spring, there were a number of large-scale events which had the potential to impact at least subsets of the population.

To explore this possibility further, we created several exploratory figures, representing the 7-day rolling average of trait levels across the year. These figures also include the dates of key events during 2020, such as the killing of George Floyd, the start of the school year, and the presidential election. Figure 2 shows the national trends for Anxiety, and figures for the other traits are included in the supplementary material (Figures S14-S20). In Figure 2, we see some evidence that large events impacted national personality. For example, the presidential election coincided with the highest levels of Anxiety, while in prior years, Anxiety was below average levels during this time of year. In addition, Anxiety tended to be high throughout the Fall of 2020, perhaps due to both the political election and instability in school openings. However, we do not see similar trends in Anxiety coinciding with the killing of George Floyd or the summer of protests. Overall, these figures present mixed evidence for the impact of national events on national personality.

Fluctuations in personality traits

We examine the daily fluctuations of personality states using a dynamics approach (Ong & Ram, 2016). Through this approach, we assess three indices of fluctuation: variability, instability, and inertia. For all analyses, we use the weighted daily averages (not smoothed), in order to avoid artifactual results; we use all days from January 1 through December 31. We caution against comparing broad traits to narrow ones in the analyses of variability and instability, given that broad traits were assessed with a greater number of items that are less highly correlated. These differences in psychometric properties may contribute systematically to
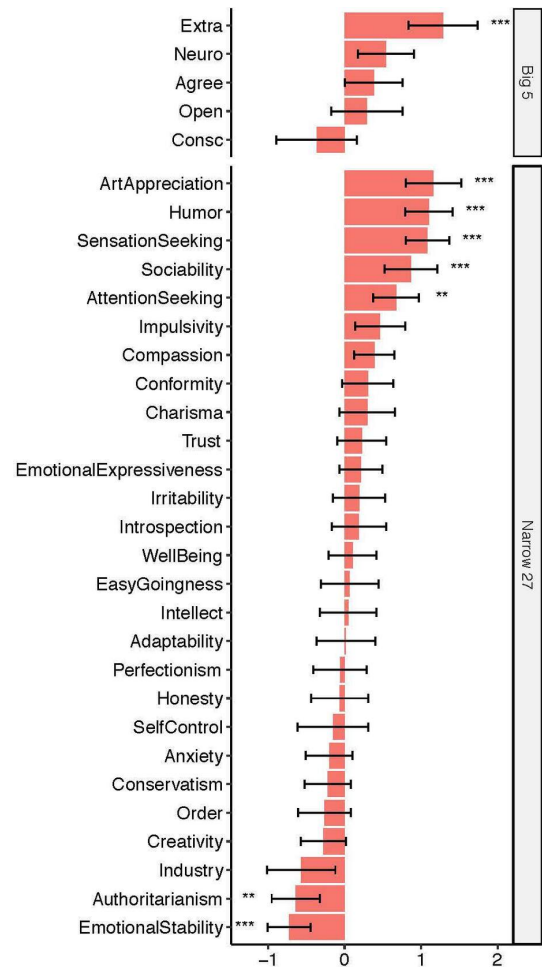

Figure 1. Change in national personality traits after declaration of national emergency (March 13, 2020)

Bars represent the standardized amount of change in daily personality states; error bars are 95% confidence intervals. Stars represent statistical significance after adjusting p-values for multiple comparisons using a Holm correction; ** p < .01, *** p < .001.

differences in amounts of variance. Inertia results, on the other hands, are in a standardized format.

As can be seen in Figure 3A, national traits had similar levels of variance across days, suggesting that traits deviated from the country's average level to the same extent. Traits were scored at the person-level such that all traits had a mean of 50 and standard deviation of 10. When aggregated to the day level, we see an expected reduction in variability, although not equally across traits. Conscientiousness and Openness were the most variable of the Big Five, although not statistically significantly so. We interpret these results to suggest that personality traits, broad and narrow, were relatively similar in terms of their variability across days. That is, no one trait was unchanging. Yet while traits were similar in their levels of variability, there were notable differences in instability, or the amplitude and tendency with which national personality was likely to change from one day to the next (see Figure 3B). Instability was measured using the mean square successive difference (Ong & Ram, 2016). Large values of instability suggest that, from one day to the next, national personality levels are likely to change and the magnitude of this change is large. Take
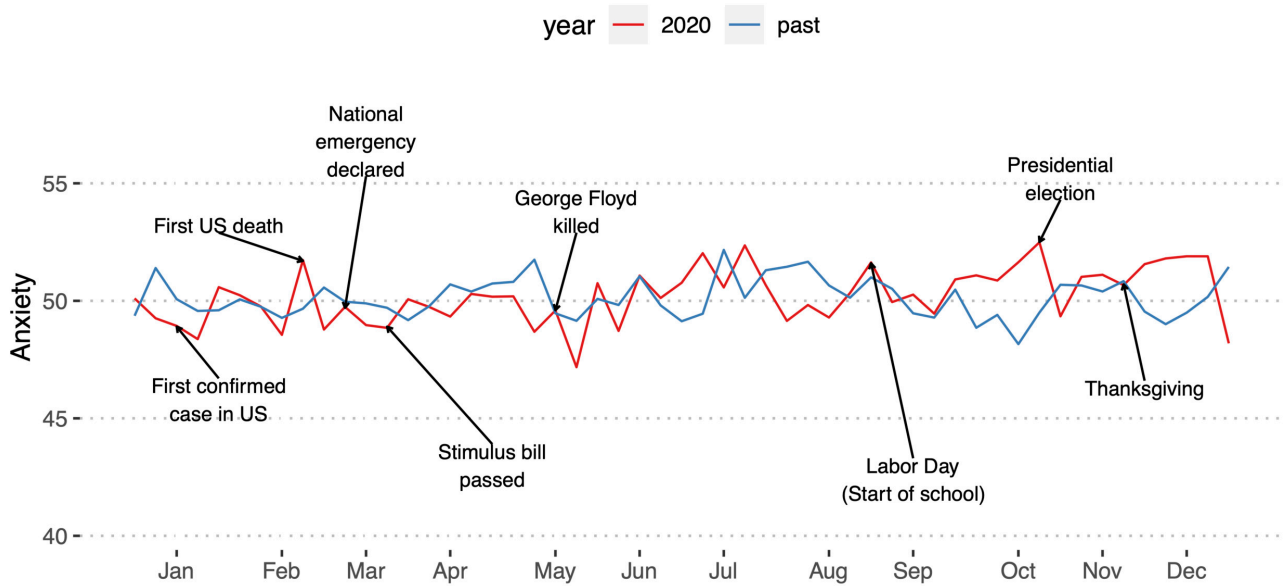
Figure 2. Weekly levels of anxiety

The red line depicts the weekly average of anxiety in 2020, while the blue line represents the weekly average across 2018 and 2019. Daily personality means were calculated using population weights, and then T-scored compared to all data (2018-2019). Key events in 2020 are plotted as well, to aid the interpretation of fluctuations in personality levels and discrepancies from prior years. The shaded ribbons represent the 95% confidence interval; standard errors were calculated from the daily weighted variance (weighted according to population census weights), pooled, and divided by the square root of the total number of participants.

for example, Attention Seeking; this was the least stable of the narrow traits. If Attention Seeking is high on a Tuesday, we would not be surprised to see it drop precipitously on Wednesday or bounce back again on Thursday. Compare this to Sociability. If Sociability is high on Thursday, we would expect it to be high on Friday. A note of caution that these effect sizes are unstandardized, so cutoffs for "high" and "low" instability are difficult to estimate. Rather, we suggest the relative comparison of traits is more informative. The pattern of instability suggests that interpersonal traits are the most variable. Consider that Attention Seeking showed great instability, followed by Adaptability and Humor. On the other hand, Honesty, Intellect, Emotional Stability, and Introspection were more stable. This pattern suggests important day-to-day changes in interpersonal traits, perhaps reflecting changing attitudes about socializing, or perhaps even changing attitudes about communality with fellow Americans, as social and political events became increasingly divisive during 2020.

Finally, we examine the inertia of personality states (Figure 3C), as measured by the autocorrelation (Ong & Ram, 2016), or the correlation of trait levels one day with the next. Inertia is similar to instability (in the opposite direction), in that it indexes the likelihood of change from one day to the next. However, unlike instability, it does not account for the amplitude of change. None of the inertia estimates were significantly different from zero, in part driven by the lower power of this study to detect effects smaller than $r = .10$; in other words, there was no evidence that the nation persisted in specific personality states across multiple days. In combination with the instability analyses, the inertia findings suggest that personality traits are likely to fluctuate from day to day. However, this may also be dri-

ven by the use of a cross-sectional study, in which sampling error may, even after weighting, obscure some group-level trends.

Trait fluctuations associated with national health

Our results suggest that some national personality traits changed since the national emergency was declared, and that even for traits which did not change, there were fluctuations in national personality states during 2020. It remains to be seen whether these fluctuations are meaningful or reflected in other aspects of national activity. To evaluate this, we examine the associations between personality states and other indices of national economic and public health. More specifically, we examined the correlations between daily personality states and daily new cases of COVID-19 and the closing prices of the S&P 500.

The 7-day moving averages for all affective traits were associated with one or more of the physical health and financial indicators (see Figure 4 for correlations with COVID-19 cases and Figure 5 for correlations with financial markets). Trait Neuroticism was strongly associated with both outcomes – increases in both daily COVID-19 cases and, perhaps surprisingly, S&P500 closing prices. Correspondingly, there are large positive correlations between these outcomes and Anxiety and Irritability, and negative associations with Well-Being and Adaptability. Counter-intuitively, Easy-goingness was also positively associated with COVID-19 cases and the S&P closing prices, although we note that this trait is somewhat more reflective of low industriousness than emotion generally.
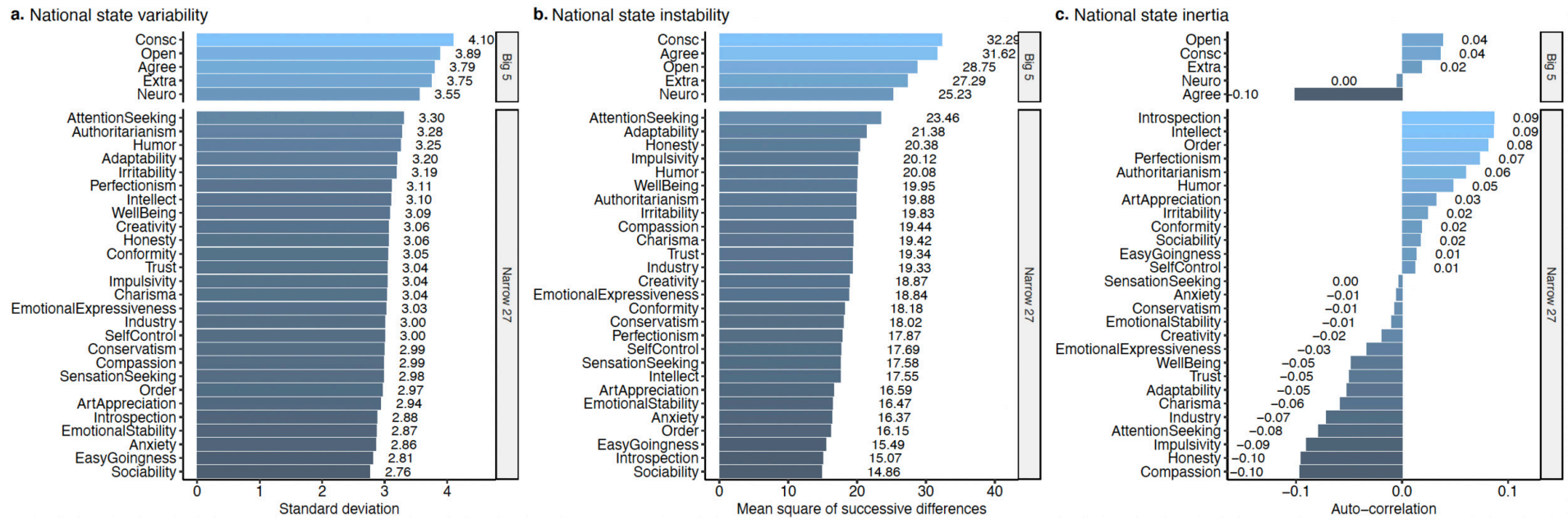
Figure 3. Personality state dynamics

Bars represent bias corrected and accelerated 95% confidence intervals estimated using bootstrapping. **a.** Variability in personality states. Bars represent the standard deviation of the national daily states; the standard deviation value is also printed next to the bar. Longer bars (higher values) indicate greater levels of variability. **b.** Instability in national states, as measured using the mean square of successive difference (MSSD) from one day to the next. Bars present the value of the MSSD. Longer bars indicate greater instability, which captures both the tendency to change and change amplitude. **c.** Inertia in national states, as measured using the autocorrelation. Positive values indicate that on any day, the nation is more likely than not to be in a similar state as the day before, while negative values indicate that the nation is more likely to have changed.

Conscientiousness was negatively associated with both outcomes, which may correspond to the generally positive relationship of this trait with health outcomes (Bogg & Roberts, 2004; Weston et al., 2015) and also its association with risk avoidance (Ehsani et al., 2015; Hampson et al., 2000). Extraversion and associated lower traits (including Sociability, Humor, Charisma) were negatively associated with new COVID-19 cases and S&P prices, suggesting an overall decrease in Extraversion during the year.

Discussion

In summary, the present research found evidence for change in national personality traits after the onset of the COVID-19 pandemic, specifically increases in trait Extraversion and associated narrow traits (e.g., Sociability, Humor, and Sensation Seeking). Fluctuations in social traits were also associated with increased numbers of new daily COVID-19 cases and drops in the S&P500, suggesting that these changes and fluctuations in national personality are connected with larger psychological processes that impact both daily lives and long-term outcomes for the country. There was no supporting evidence that these changes were driven by annual or seasonal changes. While it remains a possibility that some or all of this change was driven by a shift in sampling characteristics (i.e., lockdowns increased the likelihood that more extraverted individuals participated in the survey because they could no longer socialize), other changes during the lockdown period suggest that more substantive factors were involved. These changes include increases in Art Appreciation, Compassion, and Emotional Expressiveness, and decreases in Emotional Stability and Authoritarianism. Changes in these traits are less readily explained by shifts in participant sampling than the circumstantial factors of pandemic-induced restrictions and suffering.

Mean-level increases in affective traits (e.g., Neuroticism) were not found, but analysis of personality state dynamics revealed substantial instability in daily national state Neuroticism and related traits, such as Well-Being, Anxiety, and Irritability. These fluctuations are meaningful (i.e., not simple sampling error), as evidenced by their substantial correlations with other national indices, though challenging to interpret with respect to personality theory. One explanation is methodological. Consistent with recognition that affective traits are more labile than other personality traits (Gross et al., 1998), the appropriate time frame for assessing change in these traits is likely distinction from the months-long window used to compare trends before and after the lockdown.

These findings shed light on another methodological issue as well. Unlike short-term fluctuations in the affective traits, mean-level changes in social traits during the lockdown run counter to expectations based on the behavioral or "act frequency" conception of traits (Buss & Craik, 1983). Mean *self*-ratings increased due to the deprivation of opportunities to engage in social behaviors, whether due to a change in the make-up of respondents and/or increased self-appraisals of social tendencies. This highlights the merits of informant-reports with respect to convergent validity. The use of national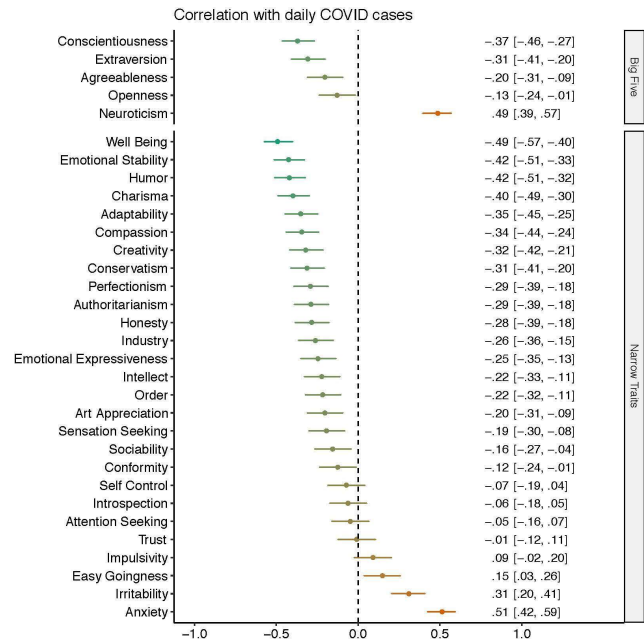 indices of personality traits for tracking changes over time (Baugh et al., 2021) would be substantially improved by the inclusion of informant-reports as a means of distinguishing these deprivation effects from changes in behavioral frequency. The collection of informant-reports should be prioritized in subsequent research on changes in personality at the national level.

This study adds to the growing literature on regional personality (Rentfrow et al., 2008), especially national person-

Figure 4. Correlation of traits with indices of pandemic severity (January 1 – December 31, 2020)
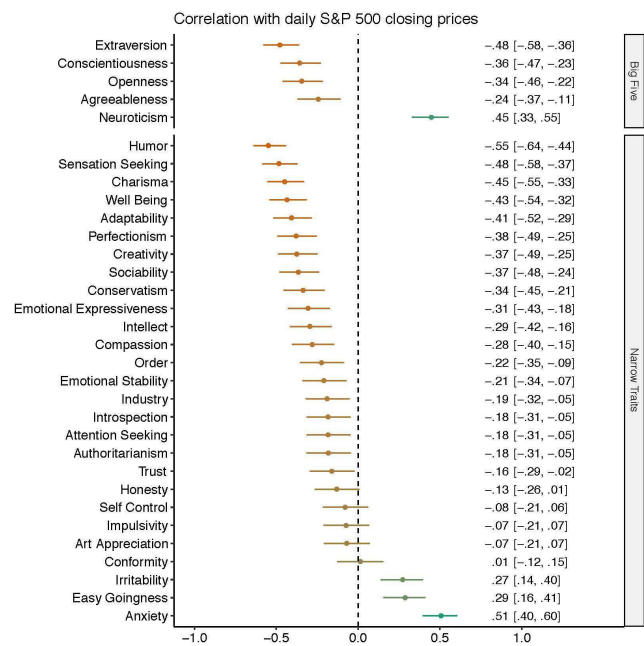
Brackets contain 95% confidence intervals.

Figure 5. Correlation of traits with indices of financial markets (January 1 – December 31, 2020)

Brackets contain 95% confidence intervals.

ality, by being among the first to consider how national personality changes over short intervals and in response to a significant global crisis. Our work points to the utility of measures of narrow traits in this field, as the narrow and unidimensional state fluctuations were those most highly correlated with daily national outcomes. Future research should examine the associations of daily fluctuations in national personality with other metrics of import to economists, public health advisors, and others who work in policy, to understand the psychological underpinnings of these outcomes. Moreover, additional work should seek to model the underlying causal processes; it remains unknown whether fluctuations in traits cause these outcomes or are reflections of other processes.

Changes and fluctuations in Humor speak to the possibility of the bidirectional processes. We propose that changes in traits provide insight into how a nation chooses to react to emergencies. Humor is used to facilitate interpersonal relationships (Ziv, 2010); compare the relatively higher levels of humor during the spring of 2020 to the low levels in the fall and winter. Humor rose when the nation faced an emergency that was perceived to affect all its citizens. It can be argued that no person's life was untouched by the pandemic, at least in terms of day-to-day routines. However, as the summer approached, it became apparent that all citizens were not affected equally. By the time of the presidential election, American citizens were no longer fighting a pandemic together, but fighting each other for control of the federal government. Correspondingly, Humor – and attempts to build community – plummeted.

The current study only examines change through December 31, so a remaining question is the extent to which the observed changes in national personality are lasting. However, regardless of the long-term impact on personality, even short-term changes in these traits may have substantial impact on national outcomes, given the associations between daily fluctuations and other indices. Especially if there is evidence that some personality states cause outcomes (rather than the other way around), even changes lasting a week or only a few days could have repercussions lasting months or years. For example, it was notable to see no change in affective traits (Neuroticism, Anxiety, etcetera) over longer intervals, but to see substantial short-term instability in these traits and strong associations with national indices of health.

Statistical power in this study was limited by the length of data collection (N_{days} = 366 days in 2020), despite the large number of participants who provided data. While greater statistical power could be achieved by widening the time frame, we believe that days outside this time period constitute a different population from the days of interest to this study, at least with regard to historical years. The year 2020 was a unique time in the nation's history, with major news related to (1) the COVID-19 pandemic, the national emergency, and state-ordered lockdowns, (2) social unrest and injustice, and (3) a major political election in which a sitting president refused to support a peaceful

transfer of power. While the United States has been troubled by public health, political, and civil emergencies in the past, we cannot think of a time when we have grappled with all three simultaneously. Moreover, the Internet and social media have connected the average citizen to these issues with more regularity and intimacy than ever before. With that in mind, we do not view the current study as an attempt to find the definitive and context-independent associations between personality fluctuations and outcomes, but rather a demonstration that change and fluctuations in nation-level personality are meaningful, informative, and worthy of consideration by researchers and policymakers alike.

Importantly, the cross-sectional design of the current work is a significant limitation. Given this design, we cannot make strong claims about personality change within individuals, nor can we say definitively that the findings herein are not driven by a shift in sampling characteristics during this period. To do so would require either large-scale longitudinal data collection with high frequency assessments or, in cross-sectional data, carefully randomized sampling of participants to reduce the potential of bias due to "opt-in" participation.

While much attention has been paid to the well-being of the nation during the COVID-19 pandemic, the present research points to the importance and utility of national personality as a focus of study. Our findings suggest that national personality is impermanent, and that fluctuations in personality states are meaningfully linked to important outcomes. Future research may be able to harness this information for better understanding of national health and psychology-informed policy intervention

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Author Contributions

Contributed to conception and design: DMC, SJW
Contributed to acquisition of data: DMC, SJW
Contributed to analysis and interpretation of data: SJW, DMC
Drafted and/or revised the article: SJW, DMC
Approved the submitted version for publication: DMC, SJW

Competing Interests

Authors have no known conflicts of interest to disclose.

Data Accessibility Statement

Pre-registration of this work can be accessed through the Open Science Framework (OSF) at https://osf.io/ypbfn.

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