Personality and change in perceived control during the acute stage of the coronavirus pandemic

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ABSTRACT

Lower perceived control (PC) is related to maladaptive psychological responses to stressful events, yet it is unclear whether longer-term situations are associated with PC change over time. This study examined PC change during the beginning of the coronavirus pandemic and whether trajectories varied by age and personality. Personality was assessed in 2455 U.S. adults (18–100 years) from an online study conducted January–February 2020. PC was assessed across three follow-ups (March–July 2020). Latent growth curves modeled PC change. In controlled models, PC decreased ($\beta = -0.107$, $p = .005$). Older adults had higher PC than younger adults ($\beta = 0.012$, $p = .001$), and experienced less PC decline ($\beta = 0.012$, $p < .001$). All personality traits but Openness were related to PC at baseline (βs ranged from -0.912 to 0.543, ps $< .001$). Conscientiousness ($\beta = 0.155$, $p = .002$), Extraversion ($\beta = 0.128$, $p = .008$), and Agreeableness ($\beta = 0.099$, $p = .044$) were associated with less PC decline. Employment ($\beta = 0.160$, $p = .022$), health ($\beta = 0.133$, $p = .002$), and disease burden ($\beta = -0.056$, $p = .014$) were also associated with PC change. These results were largely driven by the financial dimension of PC. This study provides evidence for PC change during the COVID-19 pandemic and identifies sociodemographic, personality, and health moderators of PC trajectory.

1. Introduction

The coronavirus disease 2019 (COVID-19) has been uncontrollable and unpredictable since the beginning of the pandemic. During such unpredictable circumstances, a strong sense of perceived control (PC) over one's life is important for adaptive stress response and management (Rippé et al., 2021). PC—the amount of control people believe they have over external events or outcomes—takes into account personal factors that affect situational demands (e.g., cognitive appraisal, coping) and self-regulation (e.g., emotion and motivation; Rotter, 1966). Although PC is a valuable internal resource and indicator of resilient (or susceptible) psychological states during stress (Yeo & Yap, 2020; Zheng et al., 2020), it is also malleable over time and reactive to stressful events, including infectious disease outbreaks (Phillips et al., 2021). Stressful situations may erode PC (Skinner, 2016), particularly situations that are unpredictable and unprecedented, like the coronavirus pandemic.

Theories suggest PC can serve as a psychological resource during stress. Compensatory models, for example, suggest higher PC during situations that are not controllable helps support better psychological adjustment and health (Ranchor et al., 2010; Thompson et al., 1993): Higher PC is associated with psychological resilience among adults diagnosed with incurable diseases (S.E. Taylor, 1983) and health protective and infection management behaviors during the H1N1 pandemic (Karademas et al., 2013). During the coronavirus pandemic, higher PC helped mitigate the effect of lockdowns on mental health (Gan et al., 2020), whereas lower PC among health care workers was associated with more fear and distress (Marton et al., 2020). Even during non-stressful times, higher PC is associated with better physical health and lower mortality (Lachman & Agrigoroaei, 2010; Turiano et al., 2014), perhaps due to healthier behavioral, motivational, and cognitive responses to stress (Skinner, 2016; Volk et al., 2021).

It is important to identify psychological factors that support PC during stressful situations. In particular, the five-factor model (FFM; Costa & McCrae, 1992) of personality has been associated previously with both average levels of PC (Kaiseler et al., 2012) and PC change over time (Kandler et al., 2015; Toyama et al., 2022). The FFM

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operationalizes enduring pattern of actions, behaviors, and thoughts along five dimensions: Neuroticism (e.g., anxious, self-conscious, impulsive, vulnerable), Extraversion (e.g., warm, gregarious, assertive), Openness (e.g., fantasy, aesthetics, feelings), Agreeableness (e.g., trusting, straightforward, compliant), and Conscientiousness (e.g., competent, orderly, achievement-oriented). Two traits in particular—Neuroticism and Conscientiousness—are associated with psychological and behavioral responses to stressful events (Aschwanden et al., 2021; Sutin et al., 2020) and inform stress-minimizing strategies (Kaiseler et al., 2012). And, indeed, higher Neuroticism and lower Conscientiousness are associated with lower PC (Caci et al., 2020; Kaiseler et al., 2012; Kandler et al., 2015), and Conscientiousness in particular is related to less declines in PC over time (Kandler et al., 2015; Toyama et al., 2022). Theoretical models of Neuroticism highlight vulnerability to stress as a key trait component (Costa & McCrae, 1992), empirically expressed as perceiving less control over one's current circumstances (Kaiseler et al., 2012). Theoretical models of Conscientiousness, in contrast, highlight competence as a core component of this trait (Costa & McCrae, 1992), empirically expressed as greater feelings of control (Toyama et al., 2022); in this way, personality may affect PC via appraisal and coping processes (Kaiseler et al., 2012). During the pandemic, higher Neuroticism and lower Conscientiousness, Openness, and Agreeableness have been associated with lower PC measured cross-sectionally (Bogg & Milad, 2020). The present study extends this literature by examining change in PC and how personality associates with this trajectory.

This study examined PC change over the first four months of the COVID-19 pandemic and whether personality was associated with PC and change in PC in a national sample of American adults. We hypothesize that: 1) PC will decrease during the first four months of the COVID-19 pandemic; 2) higher Neuroticism will be associated with lower PC and greater decline in PC over time; 3) higher Conscientiousness will be associated with higher PC and increase in PC over time (i.e., less decline). Since less is known about PC and Extraversion, Openness, and Agreeableness, we do not make hypotheses for these traits. Exploratory analyses tested whether these associations were moderated by age. Additional exploratory analyses also examined the relation between sociodemographic and health-related variables and the trajectory of PC.

2. Methods

2.1. Participants and procedure

Participants were 2455 consented adults in the U.S., aged 18–100 years (50.32 ± 16.99; 50.3% men). Participants were recruited online (www.dynata.com) to complete a Qualtrics survey. Participants were compensated for their participation, with additional incentives to maintain retention (wave 2 = 50%, wave 3 = 75%, wave 4 = 100%). Excluded and missing data are documented in Supplementary Material (Table S1). Descriptive statistics for all variables are in Tables 1 and S2. Details of the original study sample, design, and methods are at https://osf.io/q8cpd/.

2.2. Study design

Four waves of data were collected over six months: wave 1 (1/31/2020–2/10/2020), wave 2 (3/18/2020–3/29/2020), wave 3 (4/23/2020–4/29/2020), and wave 4 (7/10/2020–7/20/2020). Wave 1 data was collected prior to the onset of COVID-19 in the U.S. to assess measures related to personality and health. Waves 2–4 were conducted after COVID-19 was declared a global pandemic, and included pandemic-related questions. Wave 2 data collection occurred during the '15 Days to Slow the Spread' campaign (White House, 2020). Wave 3 data collection occurred during the 'Slow the Spread' guideline extension to April 30, 2020 and when stay-at-home orders were implemented in most

Table 1
Descriptive statistics of variables included in analyses.

	Assessment 1 1–2/2020	Assessment 2 3/2020	Assessment 3 4/2020	Assessment 4 7/2020
Sample	2455	2266	1838	1065
Age (years)	50.32 (16.99)	50.60 (16.87)	52.80 (16.15)	57.99 (14.65)
Men (%)	50%	50.9%	53.4%	59.3%
Women (%)	48.7%	48.2%	46.1%	40.4%
Transgender/other	1.8%	0.9%	0.5%	0.3%
Asian/Pacific Islander	8%	8.1%		
Black (%)	16.5%	15.3%		
White (%)	68.1%	68.4%		
Otherwise-identified	1.9%	1.6%		
Hispanic (%)	11.4%	11%		
Education (level)	4.16 (1.51)	4.17 (1.50)		
Working (%)		55.7%		
Not working (%)		44.3%		
Republican (%)		30.4%		
Democrat/other (%)		69.6%		
Health		3.52 (1.01)		
Disease burden	1.38 (1.57)			
Perceived control		6.26 (2.20)	6.14 (2.14)	6.79 (2.03)
Neuroticism	2.63 (0.79)			
Conscientiousness	3.85 (0.70)			
Extraversion	3.12 (0.65)			
Openness	3.46 (0.62)			
Agreeableness	3.69 (0.64)			

Note. Mean (SD) given unless specified (numbers, percentages). *n*s vary due to missing data.

states (Frieden, 2020). By the wave 4 data collection, SARS-COV-2 cases roughly doubled from cases reported during wave 3 and COVID-19 deaths surpassed 150,000 (CDC, 2020). The hypotheses and analyses for this study were preregistered (https://osf.io/7rnjz). Materials for all waves are at https://osf.io/guj3w/. All materials and procedures were reviewed and approved by the institutional review board at a local university.

2.3. Measures

2.3.1. Personality

Personality (wave 1) was measured with the 60-item Big Five Inventory-2 (BFI-2; Soto & John, 2017). Each item was rated on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Items were reverse-scored if necessary and averaged to create a total score for Neuroticism (α = 0.89), Extraversion (α = 0.81), Openness (α = 0.80), Agreeableness (α = 0.83), and Conscientiousness (α = 0.88).

2.3.2. Perceived control

PC was measured (waves 2–4) with the 3-item Domain-Specific Control scale from the Health and Retirement Study (Smith et al., 2017). These single-item measures are unidimensional assessments of control beliefs (health, social life, financial situation) on an 11-point scale (0–10; *no control* to *complete control*). The three items were averaged to create a composite score (wave 2 α = 0.73, wave 3 α = 0.66, wave 4 α = 0.67). Lower scores reflect lower PC.

2.3.3. Covariates

Self-reported covariates (from wave 1) included age (years), education (1 = less than high school to 7 = PhD/equivalent), gender (1 = women & transgender/other/unknown, 0 = men), race (1 = Black vs. 0 = White; 1 = Otherwise-identified vs. 0 = White), and ethnicity (Hispanic = 1, no = 0).

2.3.4. Exploratory covariates

In preregistered exploratory analyses, nominal variables (wave 2) were recoded: Employment status was 1 = working for pay, 0 = not working for pay and political affiliation was 1 = Republican, 0 = Democrat and Independent/nonpolitical/other. Self-rated health (wave 2) was assessed with the item "In general, would you say your health is…?" Participants rated their health on a scale from 1 = poor to 5 = excellent. Disease burden (wave 1) was assessed with the item "Has a doctor ever told you that you have: high blood pressure; diabetes; asthma; cancer of any kind (except skin); heart condition; stroke; arthritis; depression; chronic respiratory disease; kidney disease; and/or liver disease." Each disease was scored yes = 1 or no = 0 and summed: Higher scores indicate more burden.

2.4. Statistical analyses

We used SPSS 26 for descriptive statistics and Mplus 8.5 (Muthén & Muthén, 1998-2020) for structural equation models. Multilevel latent growth curve models (LGCM) were used to model: (1) unconditional PC change over the three waves during the pandemic, (2) conditional PC change with covariates, and (3) personality predictors of latent PC change with covariates. Predictors were grand-mean centered. Continuous variables were analyzed as unstandardized scores, which deviates from the preregistered protocol. Standardized effect measures were reported as Cohen's d for mean differences in PC. To test whether the associations were moderated by age, continuous interaction terms of personality by age were computed for each trait and used to predict PC intercepts and slopes (see Supplementary Material).

Exploratory analyses tested for associations between PC and employment, political affiliation, health status, and disease burden. We also performed simple slope analyses to test whether associations between personality and PC were moderated by gender, race, ethnicity, education, employment, political affiliation, health, and disease burden. Exploratory findings are detailed in Supplementary Material.

3. Results

Descriptive statistics are in Table 1. Values for variables are reported as means for intercepts and slopes across the sample. Positive values indicated positive means and increases per unit of time, whereas negative values indicated negative means and decreases per unit of time. Goodness-of-fit for LGCMs were poor for the uncontrolled models and adequate for the controlled models (Table S3).

3.1. PC change during the first four months of the pandemic

Participants reported PC slightly above the mid-point of the scale. The slope parameter was negative but insignificant (Table S3). With the inclusion of basic covariates, the slope of PC became significant and indicated decline over the first four months of the pandemic, which supports the first hypothesis. Exploratory covariates attenuated this decline, but the association remained significant. Age was the only covariate related to the slope of PC: Younger adults reported greater decreases in PC. When the three PC domains (health, social life, financial situation) were considered separately, each declined but only financial PC was significant, indicating that loss of control in this domain was driving the overall decline (Table S4).

3.2. Personality and PC during the first four months of the pandemic

The PC slope remained significant with personality included in the model (Table 2). As hypothesized, Neuroticism was associated with the intercept of PC: Participants higher in Neuroticism felt lower control. In contrast to our hypothesis, Neuroticism was unrelated to the slope of PC. Our third hypothesis was supported: Conscientiousness was associated positively with both the intercept and slope of PC. That is, participants higher in Conscientiousness felt more PC and declined less in PC over time (Fig. S1). Extraversion and Agreeableness were also associated with higher intercepts for PC and less decline in PC slopes. Openness was unrelated to either the intercept or slope of PC.

3.3. Exploratory analyses

3.3.1. Moderation by age

The interaction between personality and age on the slope of PC was significant for every trait: The association between personality and PC change was stronger among older than younger adults (Table S5).

Table 2
Model parameters and goodness-of-fit of personality and PC.

		Parameter	Neuroticism	Conscientiousness	Extraversion	Openness	Agreeableness
Fixed effects							
Initial status	Intercept	α_0	8.712***	4.434***	3.943***	5.448***	4.514***
	Slope	α_1	−0.127**	−0.126**	−0.123**	−0.106**	−0.103**
	Trait (intercept)	$\gamma_{\pi 0}$	−0.912***	0.344***	0.543***	−0.005	0.310***
	Trait (slope)	$\gamma_{\pi 1}$	−0.103	0.155**	0.128**	−0.049	0.099*
Variance components							
Level-1:	Wave 2	$\sigma^2_{\varepsilon 1}$	1.491***	1.444***	1.454***	1.510***	1.553***
	Wave 3	$\sigma^2_{\varepsilon 2}$	1.728***	1.783***	1.784***	1.753***	1.695***
	Wave 4	$\sigma^2_{\varepsilon 3}$	0.955***	0.998***	1.026***	1.047***	1.056***
Level-2:	Intercept	σ^2_0	2.577***	3.001***	2.916***	3.002***	2.917***
	Slope	σ^2_1	0.253**	0.251**	0.237**	0.233*	0.216*
Goodness-of-fit	χ^2		55.888	58.190	62.560	62.715	61.230
	RMSEA		0.061	0.062	0.065	0.065	0.064
	CFI		0.964	0.956	0.953	0.950	0.953
	TLI		0.891	0.868	0.860	0.851	0.859
	SRMR		0.029	0.029	0.029	0.033	0.036
Effect size	d		0.15	0.15	0.16	0.17	0.16

Note. Betas = unstandardized values. Covariates (wave 1) = age, gender, education, race, ethnicity. Predictor = personality (wave 1). α = level-1 (population averages) for slopes/intercepts. γ = level-1 for personality slopes/intercepts. σ² = level-2 population interindividual differences and residual variances for slopes/intercepts. PC = perceived control, RMSEA = Root Mean Square Area of Approximation, CFI=Comparative Fit Index, TLI = Tucker-Lewis Index, SRMR = Standardized Root Mean Square Residual.

  * $p < .05$.
  ** $p < .01$.
  *** $p < .001$.

3.3.2. Exploratory covariates

Not working ($\beta = -0.217$, 95%CI [-0.406, -0.027], $p = .025$) was associated with a lower PC intercept, whereas identifying as Republican ($\beta = 0.387$, 95%CI [0.190, 0.583], $p < .001$) and having better health ($\beta = 0.704$, 95%CI [0.606, 0.802], $p < .001$) were related to higher intercepts for PC. Working adults declined more in PC over time than adults who were not working ($\beta = -0.122$, 95%CI [-0.235, -0.009], $p = .034$). Adults with poorer health declined more in PC over time than adults with better health ($\beta = 0.102$, 95%CI [0.021, 0.183], $p = .013$). When basic covariates were controlled for and exploratory covariates included one at a time, working (95%CI [0.023, 0.297], $p = .022$), poorer health (95%CI [0.051, 0.215], $p = .002$), and higher disease burden (95%CI [-0.101, -0.011], $p = .014$) were related to declines in PC slopes (Table S6). Finally, the associations between Neuroticism and Openness and PC change were greater among adults with fewer diseases (Table S5).

4. Discussion

This study examined the trajectory of PC during the COVID-19 pandemic and the association between personality and the intercept and slope of PC over this time. We found support for most hypotheses: PC declined across the first four months of the pandemic (hypothesis 1), Neuroticism was associated with lower PC (intercept; hypothesis 2), and Conscientiousness was associated with both higher PC and less decline in PC over time (hypothesis 3). Only the hypothesized association between Neuroticism and greater declines in PC was not supported. This study thus suggests that PC was reactive to the pandemic, and that personality was one psychological factor associated with its trajectory. Effect sizes were generally small (median $d = 0.16$) and goodness-of-fit for PC was adequate in the controlled models, suggesting that these findings were sufficiently powered but may reflect lower sensitivity to detect slope variance in PC. Overall, the effect sizes were modest for PC change and for associations between personality and PC change.

Consistent with hypothesis 1, PC declined across the first four months of the pandemic, which was consistent with other pandemic-related research on control (Phillips et al., 2021; Wanberg et al., 2020). This decline makes sense given the unpredictability of COVID-19, especially at the beginning of the pandemic when it was less understood. Somewhat surprising was that the decline was significant for finance and not the other two PC domains, which includes health. Adults may have experienced more economic difficulties during the early months of the pandemic (e.g., job loss), resulting in declines in financial PC. This slope, however, was only significant when covariates were in the model, which is most likely due to the inclusion of age because there tends to be age differences in PC (Infurna & Okun, 2015). The age range in this study spanned all of adulthood, and, given the known age differences in PC (Villarreal & Heckhausen, 2016), age likely contributed to the shift in significance between models 1 and 2. The exploratory age interactions further suggests PC declined less among older adults; this complements previous report of higher PC among older adults during normal (Infurna & Okun, 2015; Villarreal & Heckhausen, 2016) and COVID-19-contexts (Bogg & Milad, 2020; Caci et al., 2020) COVID-19. Older adults may have more stable relationships, housing, and working situations that were less susceptible to pandemic-related disruptions. Such stability may have better supported their feelings of control. Younger adults reported more stress, anxiety, and depressive symptoms during the pandemic (Rossi et al., 2020; Yeo & Yap, 2020), suggesting they may be more susceptible to psychological distress during low-control situations. The steepest decline was found for financial PC, which may have contributed to the age difference.

Personality is a psychological resource that shapes affective, cognitive, and behavioral responses to situations. We found partial support for hypothesis 2: Higher Neuroticism was associated with lower PC (expected) but was unrelated to PC over time (unexpected). This result somewhat contradicts findings by Kandler et al. (2015), who reported cross-sectional and longitudinal correlations between Neuroticism and PC. However, the directionality of the effects in the pre-pandemic study is less clear and the results do not consider uncontrollable events like pandemics. Neuroticism may be closely associated (but does not necessarily predict) PC change over time, or perhaps these trajectories should be observed over longer periods. Regression to the mean might have also attenuated any effect of the pandemic. Since PC is informed and updated by learned experiences, adults with higher Neuroticism may already experience higher stress arousal and anticipate less control over their environment. Thus, for individuals high in Neuroticism, PC may have started and remained low across the pandemic.

We did find support for hypothesis 3: Higher Conscientiousness was associated with both higher PC and less decline in PC over time. The association between Conscientiousness and the intercept replicates previous cross-sectional associations reported during the pandemic (Bogg & Milad, 2020). It also extends these findings to show that Conscientiousness helps support maintaining PC over time, which is consistent with the positive association between Conscientiousness and PC change in longitudinal studies prior to COVID-19 (Kaiseler et al., 2012; Toyama et al., 2022). Adults higher in Conscientiousness tend to engage in behavioral and psychological strategies that minimize stress (Aschwanden et al., 2021; Kaiseler et al., 2012) and thus may have been able to better adapt to the unforeseen impediments caused by COVID-19. Higher, sustained PC—even in uncontrollable situations—may be one pathway by which Conscientiousness contributes to better long-term outcomes. Our findings are consistent with theoretical models that implicate higher Conscientiousness and PC with qualities that protect against psychological distress during stressful events (Infurna & Okun, 2015; Villarreal & Heckhausen, 2016).

Although not hypothesized, Extraversion and Agreeableness were also associated with the intercept and slope of PC. Higher Extraversion is associated with resilience (Hajibaba et al., 2015) and problem-focused coping (Agbaria & Mokh, 2021). Higher Agreeableness is linked with more perceived health consequences and problem-focused coping (Agbaria & Mokh, 2021; Bogg & Milad, 2020), which may help attenuate PC decline. Higher Extraversion and Agreeableness are also linked with better adherence to health guidelines, less concern, and perceiving fewer COVID-19-related changes and impacts on daily life (Aschwanden et al., 2021; Bogg & Milad, 2020), which may also bolster PC.

This study supports related research that links pre-pandemic assessments of experiences (e.g., weight discrimination; Sutin et al., 2020) and personality (Aschwanden et al., 2021; Stephan et al., 2021) with psychological and behavioral responses to COVID-19. Implementing control-giving techniques (e.g., cognitive reappraisal) during uncontrollable events—like pandemics—could foster PC and help adults better manage feelings of anxiety, loneliness, and social isolation (Rippé et al., 2021; Zhao et al., 2021). Personality screening could also help identify vulnerable groups in need of mental health support (S. Taylor, 2019) to increase psychological well-being and improve short- and long-term adjustment (Hong et al., 2021; Rippé et al., 2021; Yeo & Yap, 2020).

4.1. Limitations, strengths, and future directions

Strengths of this study include personality assessed prior to COVID-19 and a longitudinal, multi-wave design during the pandemic. There are, however, some limitations: First, attrition occurred between waves 1–4, which may have affected sample distribution. Second, although the online-based approach was more feasible than an in-person approach and allowed us to reach more participants across the country, it does not represent the broader population (e.g., adults with lower digital literacy). Third, our PC measure was brief and domain-specific; a longer scale may provide more nuanced explanations of PC change. Future research would also benefit from additional timepoints to monitor PC over longer intervals. Finally, analyses were focused on personality and did not include additional variables accounting for PC change—like perceived stress or home environment (Brown et al., 2020; Zheng et al.,

2020). Although we incorporated exploratory covariates to represent additional contexts, other sociodemographic markers of advantage and disadvantage might also affect PC. Replication is necessary to confirm our observations. While our study used longitudinal data beyond the early pandemic, no further data collection took place after July 2020. Hence, it is unclear whether PC changes occurred beyond this point. The data were also limited to the U.S., and the pattern may vary across cultures.

4.2. Conclusion

This study found that pre-pandemic measures of Conscientiousness, Extraversion, and Agreeableness help support PC in adults during the early months of the pandemic. These findings suggest PC changed during the acute phase of the COVID-19 pandemic, and PC trajectory was moderated by distinct sociodemographic, personality, and health variables.

Data accessibility statement

The authors embrace the principle of sharing research data and have provided a description of all measures, data, and statistical scripts for the analyses reported in this manuscript on the Open Science Framework (OSF). Materials can be retrieved from https://osf.io/guj3w/. Hypotheses and analyses for this project have been preregistered at https://osf.io/7rnjz.

CRediT authorship contribution statement

A.A.S. conceived the study, performed analyses, and interpreted data with assistance from M.L. and A.R.S. A.A.S. completed the initial manuscript with contributions from J.H.L. and A.R.S. J.H.L., M.L., D.A., Y.S., A.T., and A.R.S. provided critical revisions. All authors approved the final version.

Declaration of competing interest

The authors have no potential conflicts of interest the declare regarding the research, authorship, and publication of this article.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.paid.2022.111607.

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