

SHORT REPORT

Personality and early susceptibility to COVID-19 in the United Kingdom

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Abstract

This paper takes advantage of a unique dataset with a prospectively longitudinal, nationally representative sample ($n = 5,178$) that began in 1958 and has information on COVID-19 health status in 2020 to examine the effect of Big Five personality traits on compliance with social distancing requirements and contraction of COVID-19. The results show some consistency with epidemiological recommendations (Conscientious individuals were more likely to maintain social distance and less likely to contract COVID-19; men were less likely to comply and more likely to contract) but more inconsistency (Agreeable individuals were more likely to comply with social distancing requirements yet more likely to contract COVID-19; Open and Neurotic individuals were no less likely to comply yet more likely to contract COVID-19). The results highlight the importance of Big Five personality factors for behaviour in the global pandemic and may call into question the universal effectiveness of social distancing requirements for all individuals. However, the small number of confirmed cases of COVID-19 during the early months of the pandemic requires caution in interpretation of the results. Please refer to the Supplementary Material section to find this article's [Community and Social Impact Statement](#).

KEYWORDS

coronavirus, National Child Development Study, SARS-CoV-2

1 | INTRODUCTION

Studies have consistently demonstrated that personality traits have large effects on many important life outcomes, including health and longevity (Caspi, Roberts, & Shiner, 2005; Ozer & Benet-Martínez, 2006; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007). We are currently in the middle of a global pandemic of a scale that the world has not seen since the Spanish Flu pandemic of 1918, long before the birth of modern personality psychology. Thus, the current COVID-19 global pandemic by definition provides the first opportunity for personality psychologists to examine the effects of personality traits on health during a large-scale global pandemic.

Social and personality psychologists have taken advantage of this opportunity and examined how personality factors affect perception of the global pandemic and compliance with government restrictions imposed under the lockdown in Brazil (de F Carvalho, Pianowski, & Gonçalves, 2020), Poland (Zajenkowski, Jonason, Leniarska, & Kozakiewicz, 2020), Qatar (Abdelrahman, *in press*), and the United States (Blagov, 2021); how individual differences affect the tendency to adopt conspiracy beliefs about COVID-19 in Turkey (Alper, Bayrak, & Yilmaz, *in press*); how working memory capacity influences compliance with social distancing requirements in the United States (Xie, Campbell, & Zhang, 2020); how personality traits affect the concern for and the mental health under the pandemic in Japan (Qian & Yahara, 2020); and how government policy and individual personality affect behaviour under lockdown in a worldwide survey of 55 nations (Götz, Gvirtz, Galinsky, & Jachimowicz, 2021). Even though the current situation of global pandemic is unprecedented in recent memory, these studies have found that personality factors and individual differences mostly manifested during the pandemic in theoretically predicted manners based on the prior predictions and findings of how they manifest under more ordinary circumstances.

As varied as these studies have been in their target populations, research locations, and precise outcome measures of interest, they nevertheless all have two features in common. First, because nobody could have anticipated the outbreak of the COVID-19 global pandemic in advance, all data collected on it have been necessarily retrospective and ad hoc (planned and executed only after the start of the pandemic) and, except for Götz et al. (2021), relatively small in magnitude, with only a few hundred subjects in their samples, even with the use of data collection on the internet (because it takes a long time and consumes a lot of resources to draw nationally representative samples and plan and execute large-scale studies). All of their samples have been necessarily convenience samples that are hastily collected, given the urgent need to collect such data in a hurry and present the results to the world as quickly as possible. Second, all of the studies conducted so far have examined the effect of personality factors on compliance with government restrictions and perceptions of and attitude towards COVID-19. No studies in social and personality psychology, to my knowledge, included a measure of actual COVID-19 health status (whether the respondent has contracted the disease). There have not been any studies of personality and COVID-19 conducted in the United Kingdom, either.

Taking advantage of a unique dataset that has prospectively longitudinal data on a large, nationally representative sample of a population since birth, I seek to contribute to the growing field of social psychological and personality science on COVID-19 by overcoming the two (quite understandable and necessary) shortcomings of the other studies in the field so far. The data that I used had more than 60 years worth of information on the respondents, long before the outbreak of the pandemic, and contained the actual health status of each respondent with regard to COVID-19. While personality traits are reasonably stable throughout the life course (Hampson & Goldberg, 2006; Terracciano, McCrae, & Costa Jr., 2010), thereby seemingly obviating the need for longitudinal data, the large size and representativeness of the sample, as well as its direct measure of actual COVID-19 contraction, are definite strengths over previous studies on COVID-19. I was, therefore, able to examine the effect of personality factors on the likelihood of contracting COVID-19 in the United Kingdom.

2 | EMPIRICAL ANALYSIS

2.1 | Data

The National Child Development Study (NCDS) is a large, ongoing, and prospectively longitudinal study that has followed a *population* (not a sample) of British respondents since birth for over 60 years. The study included *all* babies ($n = 17,419$) born in Great Britain (England, Wales, and Scotland) during one week (03–09 March 1958). The respondents were subsequently reinterviewed in 1965 (Sweep 1 at age 7; $n = 15,496$), 1969 (Sweep 2 at age 11; $n = 18,285$), 1974 (Sweep 3 at age 16; $n = 14,469$), 1981 (Sweep 4 at age 23; $n = 12,537$), 1991 (Sweep 5 at age 33; $n = 11,469$), 1999–2000 (Sweep 6 at age 41–42; $n = 11,419$), 2004–2005 (Sweep 7 at age 46–47; $n = 9,534$), 2008–2009 (Sweep 8 at age 50–51; $n = 9,790$), and 2013 (Sweep 9 at age 55; $n = 9,137$). There were more respondents in Sweep 2 than in the original sample (Sweep 0) because Sweep 2 sample included eligible children who were in the country in 1969 but not in 1958. In each sweep, personal interviews and questionnaires were administered to the respondents, to their mothers, teachers, and doctors during childhood, and their partners and children in adulthood. Virtually all (97.8%) of the NCDS respondents were Caucasian. The Centre for Longitudinal Studies (CLS) of University College London now conducts NCDS, and the data are publicly and freely available to registered users of the UK Data Service (<https://ukdataservice.ac.uk/>).

In May 2020, after nearly 2 months of lockdown imposed nationwide by the British government, CLS contacted all of its respondents and invited them to participate in an online survey designed to collect insights into the lives of the NCDS respondents during the lockdown in many facets of their lives: physical and mental health and well-being, family and relationships, education, work, and finances. The questions focused mainly on how participants' lives had changed from just before the outbreak of the pandemic in March 2020 up until their response to the survey during the height of the lockdown restrictions in May 2020. Further details of the COVID-19 survey are available at <https://cls.ucl.ac.uk/covid-19-survey/>. A majority (57.9%; $n = 5,178$) of those contacted took part in the online survey. All NCDS participants were 62 years old in May 2020. Table 1 presents descriptive statistics (mean and standard deviation) for all variables used in the regression analyses below.

2.2 | Dependent variable: Compliance with social distancing requirement

NCDS measured the degree of compliance with the social distancing requirement with the question “The next question is about the extent to which you are complying with the social distancing guidelines issued by the Government.

TABLE 1 Descriptive statistics

| | Mean | SD |
|--------------------------------|-------|------|
| Social distancing compliance | 9.40 | 1.08 |
| COVID-19 contraction (ordinal) | 1.31 | .59 |
| COVID-19 contraction (binary) | .06 | .23 |
| COVID-19 number of symptoms | 1.47 | 2.10 |
| Openness | 33.11 | 5.13 |
| Conscientiousness | 34.26 | 5.25 |
| Extraversion | 29.65 | 6.64 |
| Agreeableness | 37.23 | 5.09 |
| Emotional stability | 29.08 | 7.19 |
| Sex | .48 | .50 |
| Education | 2.71 | 1.36 |
| ln(earnings) | .03 | 5.88 |

On a scale from 0 to 10, where 0 means that you are ‘not complying at all’ and 10 means you are ‘fully complying,’ how much would you say you are complying with the guidelines?” The distribution of this variable is extremely negatively skewed, with a majority (62.4%) responding with “10” and virtually everyone (98.2%) in the 7–10 range. I analysed this variable with ordinal regression.

2.3 | Dependent variable: COVID-19 contraction

NCDS measured the COVID-19 health status with the question “Do you think you have or have had Coronavirus?” The respondent could choose 1 = “No” (75.0%, $n = 3,885$), 2 = “Unsure” (19.2%, $n = 996$), 3 = “Yes, based on strong personal suspicion or medical advice” (5.4%, $n = 277$), or 4 = “Yes, confirmed by a positive test” (.4%, $n = 19$). I analysed this variable with ordinal regression. In addition, I dichotomized the original ordinal variable as 0 if “No” or “Unsure,” or 1 if “Yes, based on strong personal suspicion or medical advice” or “Yes, confirmed by a positive test.” I analysed this variable with binary logistic regression.

2.4 | Dependent variable: Number of COVID-19 symptoms

NCDS asked whether the respondent had any of the 18 known symptoms of COVID-19 (fever, cough – dry, cough – mucus or phlegm, sore throat, chest tightness, shortness of breath, runny nose, nasal congestion, sneezing, muscle or body aches, fatigue, unusual loose motions or diarrhoea, vomiting, loss of smell, loss of taste, skin rash, headaches, and other) in the last two weeks. While some of these symptoms are not specific to COVID-19, there was a monotonically positive association between the self-reported COVID-19 contraction status and the number of reported COVID-19 symptoms (mean: “No” = 1.06, “Unsure” = 2.36, “Yes, based on strong personal suspicion or medical advice” = 3.73, “Yes, confirmed by a positive test” = 5.47; ANOVA: $F[3, 5,173] = 279.848, p < .001$). It is interesting to note that even the confirmed patients exhibited fewer than a third of the known symptoms. The total number of COVID-19 symptoms is a count measure with overdispersion ($M = 1.47, s^2 = 4.40$), so I analysed it with negative binomial regression (Hilbe, 2007).

2.5 | Independent variable: Big Five personality factors

NCDS measured Big Five personality factors (Openness, Conscientiousness, Extraversion, Agreeableness, and Emotional stability) with the International Personality Item Pool (Goldberg, 1999). Respondents indicated the degree of accuracy of 50 statements about themselves (10 statements per factor), such as “I am the life of the party” or “I feel little concern for others” on a five-point Likert scale (1 = very inaccurate, 2 = moderately inaccurate, 3 = neither inaccurate nor accurate, 4 = moderately accurate, 5 = very accurate). Thus, the score for each factor ranged from 5 to 50. Big Five personality factors were measured at age 51, 11 years before the COVID-19 pandemic.

2.6 | Control variables

In all of the regression analyses below, I controlled for the respondent's sex (0 = female, 1 = male) measured at birth; education (with a five-point ordinal scale: 0 = no qualification; 1 = CSE 2–5/NVQ 1; 2 = O levels/NVQ 2; 3 = A levels/NVQ 3; 4 = higher qualification/NVQ 4; 5 = degree/NVQ 5–6) measured at age 33; and earnings (natural log of annual earnings in GBP1K) measured at age 55. Past studies in public health have shown that sex, education, and earnings have significant and independent effects on health (Truesdale & Jencks, 2016; Wingard, 1984; Zajacova & Lawrence, 2018). Recall that both age and race were constant in the NCDS sample.

2.7 | Results

Table 2, Column (1), shows that, as predicted and consistent with previous findings in personality psychology, more Conscientious and more Agreeable individuals were more likely to comply with the government requirement to maintain social distance in public. Controlling for sex, education, and earnings (Column [2]) did not alter these associations. Men were significantly less likely to comply, and both education and earnings had significantly negative associations with compliance.

Table 3, Column (1), shows that more Open individuals were significantly more likely, and more Conscientious individuals were marginally significantly less likely, to contract COVID-19 during the early stages of the pandemic, prior to May 2020. Table 3, Column (2), shows that, when sex, education, and earnings were controlled, more Open and more Agreeable individuals were significantly, and more Neurotic individuals were marginally significantly, more likely to contract COVID-19. The negative association with Conscientiousness was no longer statistically significant ($p = .160$). Men were significantly more likely to contract it, but neither education nor earnings was significantly associated with COVID-19 status.

Table 4 shows that, when the COVID-19 contraction variable was dichotomized, the results were slightly different. Column (1) shows that more Open individuals were still significantly more likely to contract, but Conscientiousness was no longer significantly associated. When sex, education, and earnings were controlled, more Neurotic individuals were significantly more likely to contract COVID-19. None of the control variables were significantly associated with the binary dependent variable.

Table 5, Column (1), shows that more Open, more Agreeable, and more Neurotic individuals suffered from a significantly larger number of COVID-19 symptoms, and more Conscientious individuals suffered from a significantly fewer number. Controlling for sex, education, and earnings did not alter these patterns, except that the coefficient for Agreeableness was no longer statistically significant ($p = .117$). While men were significantly more likely to contract COVID-19, they did not suffer from a larger number of symptoms, while more educated individuals suffered from a fewer number.

3 | DISCUSSION

To the best of my knowledge, this is the first study to examine the effect of Big Five personality factors on the actual contraction of COVID-19, rather than compliance with various government mandates (social distancing, handwashing, etc.) or attitudes towards COVID-19. It is also the first study of personality and COVID-19 conducted in the United Kingdom. Taking advantage of an ongoing, prospectively longitudinal study with a large, nationally representative sample in the United Kingdom, with information on the respondents for their entire lives (62 years), I examined the association between Big Five personality factors (measured 11 years prior) and compliance with the government mandate on social distancing as well as actual COVID-19 health status and symptoms.

The analyses of the National Child Development Study (NCDS) data replicated earlier findings on the positive effect of Conscientiousness and Agreeableness on compliance (Abdelrahman, *in press*; Blagov, 2021; de F Carvalho et al., 2020; Götz et al., 2021; Zajenkowski et al., 2020), but did not replicate the earlier findings of a positive effect of Neuroticism (Abdelrahman, *in press*; Blagov, 2021; Götz et al., 2021) or a negative effect of Extraversion (de F Carvalho et al., 2020; Götz et al., 2021). In fact, Extraversion was the only Big Five factor that was not significantly associated with any of the dependent measures examined here.

Just as any study that uses a longitudinal cohort dataset, sample attrition and selection bias are potential problems in the current study. For example, NCDS respondents who participated in the May 2020 COVID-19 survey were healthier at Sweep 9 in 2013 than those who did not. On self-perceived health (1 = poor, 2 = fair, 3 = average, 4 = good, 5 = excellent), 4.4% of those who participated in the 2020 survey rated themselves "excellent" compared with 3.6% of those who did not, and .9% of those who participated in the 2020 survey rated themselves as "poor"

TABLE 2 Association between Big Five personality traits and compliance with social distancing requirements

| | Social distancing | |
|----------------------------------|-------------------|------------------------------|
| | (1) | (2) |
| Big five personality factors | | |
| Openness | .004 (.007) | .013 (.008) |
| Conscientiousness | .036*** (.006) | .032*** (.007) |
| Extraversion | -.008 (.005) | -.008 (.006) |
| Agreeableness | .055*** (.007) | .036*** (.009) |
| Emotional stability | .001 (.005) | .008 (.005) |
| Sex | | -.483*** (.082) |
| Education | | -.054 [†] (.028) |
| Earnings | | -.023*** (.007) |
| Threshold | | |
| Y = 0 | -2.883 (.443) | -3.915 (.557) |
| Y = 2 | -2.476 (.404) | -3.402 (.493) |
| Y = 3 | -2.091 (.377) | -3.064 (.463) |
| Y = 4 | -1.848 (.364) | -2.811 (.446) |
| Y = 5 | -1.202 (.340) | -2.110 (.414) |
| Y = 6 | -.905 (.333) | -1.717 (.403) |
| Y = 7 | .040 (.321) | -.733 (.389) |
| Y = 8 | 1.284 (.316) | .509 (.384) |
| Y = 9 | 2.712 (.318) | 1.974 (.385) |
| Nagelkerke pseudo R ² | .037 | .054 |
| -2LogLikelihood | 8,599.265*** | 6,531.055*** |
| Number of cases | 4,168 | 3,174 |

Note: Main entries are unstandardized regression coefficients.

(Numbers in parentheses are standard errors.)

“Threshold” is an ordinal-regression equivalent of OLS intercept.

[†] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

TABLE 3 Association between Big Five personality traits and early contraction of COVID-19

| | COVID-19 contraction | |
|----------------------------------|------------------------------|------------------------------|
| | (1) | (2) |
| Big five personality factors | | |
| Openness | .039*** (.008) | .036*** (.009) |
| Conscientiousness | -.013 [†] (.007) | -.011 (.008) |
| Extraversion | .006 (.006) | .004 (.007) |
| Agreeableness | .011 (.008) | .025* (.010) |
| Emotional stability | -.008 (.005) | -.011 [†] (.006) |
| Sex | | .348*** (.094) |
| Education | | -.028 (.032) |
| Earnings | | .003 (.007) |
| Threshold | | |
| Y = 1 | 2.254 (.367) | 2.730 (.451) |
| Y = 2 | 3.959 (.372) | 4.453 (.457) |
| Y = 3 | 6.794 (.449) | 7.132 (.530) |
| Nagelkerke pseudo R ² | .014 | .019 |
| -2LogLikelihood | 5,887.386*** | 4,448.406*** |
| Number of cases | 4,174 | 3,177 |

Note: Main entries are unstandardized regression coefficients.

(Numbers in parentheses are standard errors.)

“Threshold” is an ordinal-regression equivalent of OLS intercept.

[†] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

compared with 2.9% of those who did not. The mean self-perceived health was significantly higher among the 2020 participants than non-participants (3.51 vs. 3.16, $t = -15.848$, $p < .001$). Thus, it is possible that some of the Sweep 9 participants who did not participate in the COVID-19 survey may have suffered (or even died) from COVID-19. However, this particular problem is not specific to the COVID-19 survey. NCDS respondents who participated in Sweep 9 survey in 2013 were healthier at Sweep 8 in 2009 than those who did not, and the difference was greater in 2013, when there was no global pandemic; 18.4% of those who participated in Sweep 9 rated their health “excellent” compared with 1.0% of those who did not, and the mean self-perceived health was significantly higher among the Sweep 9 participants than non-participants (3.53 vs. 3.16, $t = -11.537$, $p < .001$). So non-random sample attrition by health appears to be constant and not specific to the times of global pandemics. However, the fact that the

TABLE 4 Association between Big Five personality traits and early contraction of COVID-19

| | COVID-19 contraction | |
|------------------------------|----------------------|------------------|
| | (1) | (2) |
| Big five personality factors | | |
| Openness | .031* (.014) | .019 (.018) |
| Conscientiousness | .011 (.013) | .013 (.015) |
| Extraversion | .012 (.012) | .018 (.014) |
| Agreeableness | .017 (.015) | .029 (.020) |
| Emotional stability | −.013 (.009) | −.023* (.011) |
| Sex | | .192 (.176) |
| Education | | −.034 (.060) |
| Earnings | | .005 (.014) |
| Constant | −4.841 (.703) | −4.862 (.868) |
| Nagelkerke pseudo R^2 | .011 | .013 |
| −2LogLikelihood | 1,826.316 | 1,362.582 |
| Number of cases | 4,174 | 3,177 |

Note: Main entries are unstandardized regression coefficients. (Numbers in parentheses are standard errors.)

† $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

NCDS sample consists entirely of a single age group (age 62 in 2020) may potentially limit the generalizability of my findings to younger or older populations.

Perhaps the most striking finding in the analyses presented above was that many of them were seemingly inconsistent with the public health recommendations from epidemiologists and the legal requirements imposed by the government throughout the world (including the United Kingdom). Citizens in all nations were and still are required to maintain social distance in order to prevent the spread of the coronavirus and reduce the risk of infection. Some of the results above were consistent with this recommendation and requirement. More Conscientious individuals were more likely to comply with the requirement to maintain social distance, and they were less likely to contract COVID-19 and suffer from fewer COVID-19 symptoms. Similarly, men were significantly less likely to comply and significantly more likely to contract (albeit with no more symptoms). In sharp contrast, however, more Agreeable individuals were more likely to comply with social distancing requirements yet at the same time more likely to contract COVID-19 and suffer from a larger number of COVID-19 symptoms. In addition, more Open and more Neurotic individuals were no less likely to comply with the social distancing requirements, yet they were more likely to contract COVID-19 and suffer from a larger number of COVID-19 symptoms. The results suggested that the public health recommendations may not be universally effective for all individuals at all times and may instead need to be tailored for different individuals of varied personality types.

TABLE 5 Association between Big Five personality traits and number of COVID-19 symptoms

| | Number of COVID-19 symptoms | |
|------------------------------|-----------------------------|--------------------|
| | (1) | (2) |
| Big five personality factors | | |
| Openness | .019*** (.004) | .023*** (.005) |
| Conscientiousness | -.023*** (.004) | -.024*** (.005) |
| Extraversion | .003 (.004) | .000 (.004) |
| Agreeableness | .018*** (.004) | .009 (.006) |
| Emotional stability | -.022*** (.003) | -.020*** (.003) |
| Sex | | -.087 (.053) |
| Education | | -.059** (.018) |
| Earnings | | -.004 (.004) |
| Intercept | .409 (.208) | .875 (.253) |
| Likelihood ratio χ^2 | 144.158*** | 109.581*** |
| Number of cases | 4,175 | 3,178 |

Note: Main entries are unstandardized regression coefficients.

(Numbers in parentheses are standard errors).

† $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

However, the very small number of confirmed cases of COVID-19 in the NCDS data ($n = 19$; .4%) during the early months of the pandemic in May 2020 (although the total of “confirmed” and “medically advised” cases was much larger; $n = 296$, 5.7%) requires caution in interpreting the results of the current analyses. More research and attempts at replication are clearly necessary to examine the effect of personality factors on COVID-19 contraction further, particularly in later months of the pandemic, to capture a larger number of confirmed cases in a nationally representative sample. Towards this end, CLS began Wave 2 of the COVID-19 survey in September 2020, and Wave 3 in January 2021.

CONFLICT OF INTEREST

There are absolutely no real or perceived conflicts of interest to report; no external funding was used for the research.

DATA AVAILABILITY STATEMENT

The data used in the current paper are publicly and freely available to registered users of the UK Data Service (<https://ukdataservice.ac.uk/>).

ETHICS STATEMENT

No ethics approval was necessary because there were no human or animal subjects involved in the research.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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