

Sociodemographic and psychological correlates of compliance with the Covid-19 public health measures in France

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Abstract: We measured compliance with the COVID-19 public health recommendations and associated them with a number of sociodemographic attributes, personality characteristics, ideological endorsements, levels of public trust, and emotional reactions to the pandemic using a quota-controlled nationwide French survey sample. Our findings show that older people and women are more likely to adhere to the public health recommendations. Further, individual-level differences in implementing the recommended measures are positively associated with the personality characteristic of conscientiousness, and negatively associated with extraversion. Further, left and right ideological extremity, and the extent to which individuals experience fear as a result of the pandemic are also associated with compliance. On the other hand, we did not find an association between compliance and formal levels of education or trust.

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Introduction

The Coronavirus Disease 2019 (COVID-19) was first identified in Wuhan, China in January 2020, having since spread rapidly across the world. COVID-19 was declared a pandemic by the World Health Organization in early March 2020. The infection and mortality rate of the disease have forced governments to implement a wave of public health measures. Depending on the context, these range from the implementation of simple hygienic rules (e.g. thorough handwashing; avoiding handshakes) to measures such as social distancing or lock-downs that cause major disruptions in citizens' daily lives.

The success of these crucial public health measures rests on the public's willingness to comply. A number of public opinion polls suggest that the public generally abides by these measures (Atchinson et al., 2020). However, individual differences in following the official public health recommendations for stopping the spread of COVID-19 have not yet to our knowledge been assessed. This study aims to fill this gap by assessing the sociodemographic and psychological correlates of implementing public health recommendations that aim to halt the COVID-19 pandemic. We investigate these associations in the context of France. France is one of the countries that has been most severely affected by the pandemic in terms of both number of cases and deaths (World Health Organization, 2020). The French government has provided a number of recommendations for the citizens¹, which gradually intensified in terms of severity, until a lockdown was imposed on March 17, 2020. Despite the grave concerns for public health, instances of public disobedience were frequently presented in the media, leading government officials to repeatedly urge the public to abide by the measures. We believe that understanding the motivations to abide or ignore public health recommendations is important for ensuring that

¹ Available at <https://solidarites-sante.gouv.fr/soins-et-maladies/maladies/maladies-infectieuses/coronavirus/coronavirus-questions-reponses> (accessed March 22, 2020)

the implementation of public health measures will be successful in tackling the spread of the COVID-19 disease. To this end, we measured compliance with the COVID-19 public health recommendations and associated them with a number of sociodemographic attributes, personality characteristics, ideological endorsements, levels of public trust, and emotional reactions to the pandemic using a quota-controlled nationwide French survey sample. The panel dimension of the survey enables us to measure our main explanatory variables of interest before the onset of the epidemic.

Our findings show that older people and women are more likely to adhere to the public health recommendations. Further, individual-level differences in implementing the recommended measures are positively associated with the personality characteristic of conscientiousness, and negatively associated with extraversion. Further, left and right ideological extremity, and the extent to which individuals experience fear as a result of the pandemic are also associated with compliance. On the other hand, we did not find an association between compliance and formal levels of education or trust.

The rest of the article is organized as follows. In the next sections we draw hypotheses about the associations between sociodemographics, personality, ideology, trust, and emotions with abiding by the COVID-19 public health measures. We then test these hypotheses using data from the French Election Study panel. In the last section we reach a number of conclusions on public compliance with the French public health recommendations.

Theoretical Expectations

The literature on people's compliance (or lack thereof) with state regulation is vast (e.g., Levi & Stokker 2000; Luttmer & Singhal 2014). Here, we focus on demographic and psychological

correlates of compliance with public health measures for which citizens' voluntary cooperation is absolutely required and full external enforcement is beyond reach in a non-totalitarian State.

Sociodemographics

Age

The key demographic that we expect to be associated with adherence to the public health recommendations is age, which has been found to be an important predictor of mortality from COVID-19. The mortality rate is very low among the younger members of the population and increases with age (Wang et al., 2020). Given that the risk of dying from the disease increases as one becomes older, self-interest suggests that age will be positively associated with personally implementing measures to stop the spread of the virus. At the same time, many of the measures that have been put in place aim at vastly reducing social interactions, which are more frequent among the young. Consequently, based on the low mortality rate and high social interaction among younger persons, we anticipate that age will be positively associated with complying with the COVID-19 measures (H₁).

Education

Education may also play a role in public compliance with the COVID-19 health measures. Research has shown that the most educated are more likely to be informed about current affairs. They may consequently be more aware of the measures, their targets, as well as the threat posed by the COVID-19 compared to the least educated. Studies have also found that the individual differences in education are also associated with information-seeking on medical issues (Ramanadhan & Viswanath, 2006). We therefore anticipate that the level of education will be positively associated with adherence to the French ministry's recommendations (H₂).

Personality Traits

We are also interested in considering the role of personality in public compliance with the measures. To this end we employ the Big Five personality framework, which constitutes the most widely used typology of personality (John & Srivastava 1999; McCrae & Costa, 1999). The model argues that individual differences in personality can be summarized in five dimensions, namely *openness to new experiences*, *conscientiousness*, *extraversion*, *agreeableness*, and *neuroticism*. We believe that at least three of the five personality dimensions should be associated with compliance to the public health measures: Conscientiousness, Extraversion, and Neuroticism. Conscientious individuals tend to be duty-bound, hard-working, and have a high sense of obligation. We anticipate that these behavioral qualities should make individuals scoring high in conscientiousness more likely to abide with the public health measures (H₃). On the other hand, we anticipate that extraversion should be negatively associated with implementing public health recommendations (H₄). This is because extroverted individuals will find it harder compared to introverted individuals to comply with isolating measures, such as avoiding public gatherings or meeting with friends, that disrupt sociability. Finally, we hypothesize that neuroticism should be positively associated with compliance (H₅). This is because individuals scoring high in neuroticism tend to be more sensitive to threat and risk-averse. Consequently they should be more likely to abide by measures aiming at minimizing this risk.

Ideology

In addition to differences in personality, we anticipate that political ideology should be associated with the propensity to implement changes in daily life in the light of the COVID-19 pandemic. Past research has shown that individuals who place themselves in ideological extremes tend to be both more distrusting of the state and its powers as well as more prone to

endorsing conspiracy theories (Van Prooijen et al., 2015). We therefore anticipate that ideological extremity will be negatively associated with abiding by the COVID-19 public health measures (H₆).

Trust

Past research in political science has shown that political trust is a key predictor of public compliance with the law (Marien & Hooghe, 2011; Scholz & Lubell 1998). Moreover, the role of political trust on public attitudes increases along with the salience of an issue in mass media. Therefore, we anticipate that higher trust toward the institutions that have the responsibility of handling the COVID-19 pandemic should be associated with a greater propensity to comply with the public health recommendations. We therefore hypothesize that trust toward the president (H_{7a}) and the scientific community (H_{7b}) should be positively associated with implementing the COVID-19 health measures.

Fear

Our final hypothesis has to do with fear. A large stream of research in social and political psychology has shown that experiencing fear toward a threatening stimulus is associated with behavioral and attitudinal change in general (Marcus et al., 2000; Vasilopoulos et al., 2018). Moreover, fear and anxiety render individuals to opt for risk-averse behavioral strategies (Lerner and Keltner, 2001) and show increased compliance with authority (Vasilopoulos et al., 2018). These findings lead us to hypothesize that experiencing fear in the light of the COVID-19 pandemic should be positively associated with complying with the public health measures (H₈).

Data and Methods

Data come from the French National Election Study (*Enquête Électorale Française-ENEF*), a panel survey that started in November 2015. After the onset of the coronavirus

pandemic, we added an additional wave, which can draw on the rich set of variables already collected in previous waves. Invitation to answer the new wave was randomly sent to ENEF panel respondents in strata (according to quotas' weight) with oversampling of the strata less likely to answer. A total of 1010 out of the panel's 24,369 respondents participated in the study on March 16-17 2020. The sample was constructed with the use of quota controls for age, gender, occupation, and stratified by size of community and region of residence (Ile de France, North-West, North-East, South-West, South- East).

The dependent variable is an index of compliance with public health measures aimed at slowing the spread of the COVID-19 disease. We asked respondents whether they have changed daily behaviors as a result of the coronavirus epidemic in a scale ranging from 0 (not at all) to 10 (very much). We presented to them a range of different behaviors recommended by the French public health authorities. These behaviors included "Washing your hands more often and / or longer"; "Coughing or sneezing into your elbow or a handkerchief"; "Stopping greeting by shaking hands or kissing" "Keeping a distance of one meter from other people outside your home"; "Having reduced your trips"; "Avoiding crowded places (public transport, restaurants, sports training, etc.)"; "Having stopped meeting your friends". The scale had high reliability ($\alpha=0.89$) and a factor analysis showed that all items load on one factor (Eigenvalue= 3.85). Table 1 presents the mean and standard deviation for the continuous and dummy variables.

Table 1: Summary statistics for continuous and dummy variables

| Variable | Mean | Std. Dev. | Min | Max |
|---------------------------------------|------|-----------|------|------|
| Compliance (dependent variable) | 0.83 | 0.19 | 0.00 | 1.00 |
| Age | 0.37 | 0.20 | 0.00 | 1.00 |
| Openness to New Experiences | 0.59 | 0.18 | 0.00 | 1.00 |
| Conscientiousness | 0.78 | 0.17 | 0.00 | 1.00 |
| Extraversion | 0.43 | 0.19 | 0.00 | 1.00 |
| Agreeableness | 0.69 | 0.17 | 0.00 | 1.00 |
| Neuroticism | 0.39 | 0.20 | 0.00 | 1.00 |
| Trust in scientists | 0.86 | 0.35 | 0.00 | 1.00 |
| Trust in the President | 0.45 | 0.50 | 0.00 | 1.00 |
| Fear | 0.59 | 0.26 | 0.00 | 1.00 |
| Hope | 0.55 | 0.25 | 0.00 | 1.00 |
| Anger | 0.52 | 0.32 | 0.00 | 1.00 |

We are interested in investigating the association of key demographic and psychological characteristics with the public’s compliance to the recommended health measures. Regarding demographics, our model controls for age, gender, level of education, and size of community. Regarding the psychological characteristics, we include individual differences in the Big Five personality traits. These were measured using the Ten Item Personality Inventory (TIPI) in September 2016 (Wave 6). The TIPI offers a concise measurement of personality for use in public opinion surveys, using two items to measure each trait (Gosling, et al. 2003). The prior measurement of the personality items is an advantage. It mitigates concern about priming and

reverse causality. Furthermore, we have included a measure of ideological self-placement, measured right before the onset of the pandemic (March 3-8, 2020) using an item that asks respondents to place themselves on a scale that ranges from 0 (“Left”) to 10 (“Right”). As we suspect that the association of ideology with changing behaviors will not be linear this variable was recoded into a categorical variable with five categories in order to assess possible differences in the implementation of health recommendation between those who are centrist compared to those who place themselves on the extremes. Moreover, we have included two items measuring trust toward a) President and b) scientists. These have been measured using a four point scale that ranges from ‘1’ (not trust at all) to ‘4’ (trust very much) and subsequently recoded into dummy variables indicating trust and non-trust.

Finally, our list of independent variables includes emotional reactions. Following the research design used to assess emotional responses to the 2015 Paris terror attacks (Vasilopoulos, 2018; Vasilopoulos et al., 2019; Marcus et al., 2019) we asked respondents the extent to which they experience a) fear b) anger and c) hope “when thinking about the situation with the COVID-19 in France” on a scale ranging from ‘0’ (not at all) to ‘10’ (extremely). While our hypothesis only involves the role of fear, past research has found that these three emotional dimensions are intercorrelated and hence it is recommended to control for all three emotional dimensions, even when one is interested in assessing the effect of only one (Marcus et al., 2017; Vasilopoulos et al., 2019)

Results

We estimated four linear regression models adding covariates incrementally, given that personality and demographic characteristics are considered causally prior to ideology, trust, and

emotional reactions (Carney et al., 2008; Vasilopoulos & Brouard, 2020)². Model 1 includes only demographic characteristics. Model 2 adds the Big Five personality dimensions. Model 3 includes ideology and trust toward the government and scientists, and, finally, Model 4 adds the emotional reactions. The findings are presented in Table 2. In order to facilitate the interpretation of the results, all variables have been recoded from 0 to 1.

Starting with Model 1, the results suggest that age is positively associated with complying with the measures ($b=0.184$; $SE=0.039$; $p < 0.001$) Further, women are more likely to have changed their behavior as a result of the COVID-19 pandemic compared to men ($b=0.087$; $SE=0.013$; $p < 0.001$). However, and against our predictions, we find that education is not associated with public compliance. This may suggest that lack of information is not a main driver of non-compliance in the context of a “focusing event” (Birkland 1998) with intensive government and media campaigns on the issue. Finally, the size of community is also unassociated with the propensity to comply with public health measures.

Further, our findings indicate that two of the Big Five personality dimensions are associated with compliance to public health measures against COVID-19. Specifically, conscientiousness is positively associated with having changed behavior in line to recommendations ($b=0.10$; $SE=0.042$; $p < 0.05$). This is in line with H₃. Moreover, extraversion is negatively associated with having changed one’s daily behaviors in the light of the pandemic ($b=-0.07$; $SE=0.033$; $p < 0.05$). This confirms H₄, illustrating that the containment measures proposed by many governments are less likely to be implemented by those who gain positive emotionality by social interactions. On the other hand, Neuroticism is associated as expected

² As a robustness tests we further controlled for department fixed effects in order to capture unobserved heterogeneity across geographical areas. This also accounts for differences of the spread of the COVID-19 and differences in the enforcement ability of the measures between departments. Results are presented in Table 1 in the Online Appendix.

with a negative coefficient but is not precisely estimated in all models. Perhaps it could be attributed to the tendency of neurotic individuals to appraise that their capacity for coping with a threatening stimulus is low, which may lead to inaction (Penley & Tomaka, 2002; Suls, 2001)

Model 3 adds the association of trust and ideology with compliance to public health instructions. The results suggest that, all else equal, ideological extremity is associated with a reduced adherence to public health recommendations. Specifically, respondents who place themselves on the far left ($b = -0.08$; $SE = 0.033$; $p < 0.05$) and the far right ($b = -0.07$; $SE = 0.03$; $p < 0.05$) are less likely to have changed their behaviors compared to those who place themselves on the center. This provides empirical confirmation for H₆. Surprisingly, the results suggest that trust toward the president and scientists is not associated with complying. This is against our predictions. Finally, results from Model 4 provide strong empirical confirmation for our eighth and final hypothesis over the association between fear ($b = 0.22$; $SE = 0.028$; $p < 0.001$) and propensity to comply with the recommended health measures.

Table 2: Demographic and Attitudinal Correlates of Compliance with Public Health Instructions (Ordinary Least Squares Regression)

| | Model 1 | Model 2 | Model 3 | Model 4 |
|---|-------------------|-------------------|-------------------|-------------------|
| Age | 0.18*** (0.04) | 0.13*** (0.04) | 0.16*** (0.04) | 0.14*** (0.04) |
| Female | 0.09*** (0.01) | 0.08*** (0.01) | 0.08*** (0.01) | 0.07*** (0.01) |
| Middle education | -0.01 (0.02) | -0.02 (0.02) | -0.03 (0.02) | -0.03 (0.02) |
| High education | 0.03 (0.02) | 0.01 (0.02) | 0.01 (0.02) | 0.01 (0.02) |
| <i>Size of community (ref. < 5000 inhabitants)</i> | | | | |
| 2,000-9,999 | -0.02 (0.02) | -0.02 (0.02) | -0.02 (0.02) | -0.01 (0.02) |
| 10,000-49,999 | -0.00 (0.02) | -0.00 (0.02) | -0.00 (0.02) | -0.00 (0.02) |
| 50,000-199,999 | -0.04# (0.02) | -0.04# (0.02) | -0.04 (0.02) | -0.03 (0.02) |
| 200,000 or more | -0.02 (0.02) | -0.02 (0.02) | -0.02 (0.02) | -0.02 (0.02) |
| <i>Personality</i> | | | | |
| Openness to New Experiences | | -0.02 (0.03) | -0.03 (0.03) | -0.02 (0.03) |
| Conscientiousness | | 0.10* (0.04) | 0.10* (0.04) | 0.08* (0.04) |
| Extraversion | | -0.07* (0.03) | -0.05 (0.03) | -0.05# (0.03) |
| Agreeableness | | 0.03 (0.05) | 0.04 (0.05) | 0.03 (0.05) |
| Neuroticism | | -0.03 (0.03) | -0.03 (0.03) | -0.07* (0.03) |
| <i>Ideology</i> | | | | |
| Far Left | | | -0.08* (0.03) | -0.05 (0.03) |
| Center Left | | | -0.03# (0.02) | -0.02 (0.02) |
| Center Right | | | -0.02 (0.02) | -0.02 (0.02) |
| Far Right | | | -0.07* (0.03) | -0.08** (0.03) |
| (Don't know) | | | -0.04 (0.03) | -0.03 (0.03) |

| | | | | |
|-----------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | |
| Trust in Scientists | | | 0.04 (0.03) | 0.04 (0.02) |
| Trust in President | | | 0.02 (0.01) | 0.02# (0.01) |
| Emotions | | | | |
| Fear | | | | 0.22*** (0.03) |
| Hope | | | | 0.01 (0.03) |
| Anger | | | | -0.00 (0.02) |
| Constant | 0.71*** (0.03) | 0.70*** (0.06) | 0.68*** (0.07) | 0.58*** (0.07) |
| Observations | 870 | 794 | 735 | 735 |
| <i>R</i> ² | 0.091 | 0.105 | 0.145 | 0.245 |

Standard errors in parentheses

$p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Discussion

Facing their largest health crisis in decades due the coronavirus pandemic, many governments are considering or already adopted health measures at unprecedented scale to slow the spread of the virus. However, enforcement is costly and compliance by citizens cannot be taken for granted. Drawing on individual panel data, we find that some basic socio-demographic characteristic as well as personality traits are relevant predictors of compliance with these measures in France. The observational nature of our data prevents us from drawing causal conclusions, and age or personality traits are not directly amenable to policy interventions. However, our results provide insights into the individual foundations of compliance in the times of Covid-19 that can provide the basis for policymakers to evaluate the effectiveness of their measures as well as for future research on the topic. Going forward, it would be desirable to complement survey self-reports with behavioral measures of compliance and to conduct experiments regarding, for instance, the effect of monitoring and social pressure.

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ONLINE APPENDIX

Table OA1. Demographic and Attitudinal Correlates of Compliance with Public Health

Instructions: Accounting for Department Fixed-Effects

| | Model 1 | Model 2 | Model 3 | Model 4 |
|---|-------------------|-------------------|-------------------|-------------------|
| Age | 0.19*** (0.03) | 0.15*** (0.03) | 0.18*** (0.04) | 0.16*** (0.04) |
| Female | 0.09*** (0.01) | 0.09*** (0.02) | 0.09*** (0.02) | 0.07*** (0.02) |
| Middle education | -0.01 (0.02) | -0.01 (0.02) | -0.02 (0.02) | -0.02 (0.02) |
| High education | 0.03 (0.02) | 0.02 (0.02) | 0.01 (0.02) | 0.01 (0.02) |
| <i>Size of community (ref. < 5000 inhabitants)</i> | | | | |
| 2,000-9,999 | -0.03 (0.02) | -0.04# (0.02) | -0.04# (0.02) | -0.03 (0.02) |
| 10,000-49,999 | -0.01 (0.02) | -0.01 (0.02) | -0.01 (0.02) | -0.00 (0.02) |
| 50,000-199,999 | -0.05# (0.03) | -0.05# (0.03) | -0.05 (0.03) | -0.04 (0.03) |
| 200,000 or more | -0.04# (0.03) | -0.04# (0.02) | -0.04# (0.02) | -0.04* (0.02) |
| <i>Personality</i> | | | | |
| Openness to New Experiences | | -0.04 (0.03) | -0.04 (0.03) | -0.04 (0.03) |
| Conscientiousness | | 0.11* (0.04) | 0.11* (0.05) | 0.10* (0.04) |
| Extraversion | | -0.06 (0.04) | -0.04 (0.04) | -0.04 (0.03) |
| Agreeableness | | 0.02 (0.05) | 0.01 (0.05) | 0.02 (0.04) |
| Neuroticism | | -0.03 (0.03) | -0.03 (0.03) | -0.07* (0.03) |
| <i>Ideology</i> | | | | |
| Far Left | | | -0.08* (0.04) | -0.04 (0.04) |
| Center Left | | | -0.02 (0.02) | -0.01 (0.02) |
| Center Right | | | -0.02 (0.02) | -0.01 (0.02) |
| Far Right | | | -0.07* (0.03) | -0.08** (0.03) |

| | | | | |
|-----------------------|---------|---------|---------|---------|
| (Don't know) | | | -0.03 | -0.02 |
| | | | (0.03) | (0.03) |
| Trust in Scientists | | | 0.04 | 0.04# |
| | | | (0.03) | (0.02) |
| Trust in President | | | 0.02 | 0.03# |
| | | | (0.01) | (0.01) |
| Emotions | | | | |
| Fear | | | | 0.23*** |
| | | | | (0.03) |
| Hope | | | | -0.02 |
| | | | | (0.03) |
| Anger | | | | 0.01 |
| | | | | (0.02) |
| Constant | 0.71*** | 0.71*** | 0.68*** | 0.57*** |
| | (0.02) | (0.06) | (0.08) | (0.07) |
| Observations | 870 | 794 | 735 | 735 |
| <i>R</i> ² | 0.093 | 0.111 | 0.149 | 0.263 |
| Number of department | 92 | 92 | 92 | 92 |

Standard errors in parentheses are clustered by department. All models include department fixed effects (*R*² is net of fixed effects).

$p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$