# For Better or Worse? Subjective Expectations and Cost-Benefit Trade-Offs in Health Behavior: An application to lockdown compliance in the United Kingdom

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# To Comply or Not To Comply?

Expectations, Preferences, and Tradeoffs in Compliance To Anti-Epidemic Measures

**Understanding the determinants of citizens' compliance (lack thereof)** with public health measures during pandemics is important for management and prevention.

Complying and failing to comply can both have positive and negative consequences for citizens' wellbeing, generating **tradeoffs in perceived costs (risks) and benefits (returns)** of alternative conducts.

▶ Health Tradeoff: Going out may get you infected; staying at home may drive you unfit, if not insane.

Since consequences of (non)compliance are *ex ante* uncertain, compliance decisions depend on **citizens' expectations over consequences & how they resolve trade-offs** between positive and negative consequences (**dis/utilities**).

▶ Heterogeneity: People may have different perceived risks of being infected, becoming unfit, insane, etc., and/or may weigh these risks differently.

Understanding main factors underlying (non)compliance for different groups and unpacking the roles of expectations and preferences is **fundamental for policy**.

▶ Policy: Information, sensitization, incentives operate through different primitives.

# What We Do

We have been investigating these issues within the context of COVID-19 by means of **two studies**, one in the UK and one in Italy.

**Today** I will focus on our UK study, where we study the **determinants of citizens' compliance to the Spring 2020 lockdown's rules in the UK**.

- ▶ We survey an **online sample of UK-based individuals**, eliciting respondents' subjective probabilities over consequences of alternative compliance behaviors along with respondents' compliance plans.

- ▶ We estimate a simple **model of compliance behavior with uncertain consequences**, which quantifies main tradeoffs individuals face and the monetary compensation required to comply.

- ▶ We implement a **randomized sensitization intervention reviewing the timeline of the "Cummings affair"** and assess its effect on compliance.

# Methodologically We Build on the Survey Expectations Lit

### Review papers
- Manski (2004, 2018), Attanasio (2009), Hurd (2009), Delavande et al. (2011a,b), van der Klaauw (2012), Armantier et al. (2013), Delavande (2014), Schotter and Trevino (2014), Giustinelli and Manski (2018), Altig et al. (2019), Elsevier Handbook of Economic Expectations (in preparation).

### Choice modelling
- Choice with uncertain states/consequences: Delavande (2008a), Zafar (2013), Wiswall and Zafar (2015a), Giustinelli (2016), and others.
- Choice probabilities with incomplete scenarios: Manski (1999), Blass, Lach, and Manski (2010), Wiswall and Zafar (2015a), Arcidiacono, Hotz, Maurel, and Romano (2020), and others.

### Expectation-based (*ex ante*) treatment effects
- Arcidiacono et al. (2020), Wiswall and Zafar (2021), Giustinelli and Shapiro (2019, 2021), Hudomiet et al. (2021).

### Learning and information treatments
- Delavande (2008b), Zafar (2011), Wiswall and Zafar (2015b), and others.

### Risk perceptions related to Coronavirus/COVID-19
- Akesson et. al. (2020), Aucejo et al. (2020), Baker et al. (2020), Bellemare et al. (2020), Bordalo et al. (2020), Bruine de Bruin and Bennett (2020), Ciancio et al. (2020), Delavande et al. (2020), Papageorge et al. (2020), among others.

# UK COVID-19 Pandemic and First Lockdown's Rules

The UK entered a strict lockdown on March 23, 2020, later than other European countries, with a TV announcement by PM Boris Johnson.

"Stay home" was the single most important message and rule, with **varying bindingness across citizen categories**.

- _General rule_: Citizens could leave home only for essential activities or specific reasons (e.g. key workers); should minimize time outside; should keep a 2+ mt distance from others.
- _Shielding_: Vulnerables (due to age or health condition) were not to leave home for 12 weeks.
- _Self-isolation_: COVID-positive individuals (households) were not to leave home for 7 days (14 days).

**Monetary fines and incentives**

- Police was given power to enforce lockdown rules through monetary fines.
- Monetary compensation schemes for the self-isolating on low income gradually introduced.

**No clear rules on specific protective behaviors** such as wearing face masks or sanitizing hands.

# UK Baseline Survey

We fielded two online surveys (baseline + follow-up) on **Prolific Academic** ( Prolific ).

Baseline: We surveyed a sample of **1,000+ adults living in UK on May 3-10, 2020**, *representative with respect to age, gender, and ethnicity* ( Sample ).

▶ About 5 weeks into the lockdown and right before Johnson announced a conditional plan for lifting of the first lockdown on May 10 ( Timeline ).

Structure: The baseline survey was structured as follows:
  (A) **You and Your Health** (age, gender, SRH, health history and conditions, BMI)
  (B) **Corona Knowledge** (awareness, symptoms, protective behaviors, stats, rules)
  (C) **Corona Experience** (own and family/friends' experience with COVID)
  (D) **Corona Behaviors** (own habits during lockdown)
  (E) **Corona Expectations** (Corona risks; compliance consequences and behavior)
      ▶ Two versions: point and interval probabilities.
  (F) **Background Info** (more demographics, SES, IQ, econ and social preferences)

Today: Will use data from **first and last two sections (A, E, F)** and on **point probs**.

# Intro to Expectations Battery

Expectations section (E) starts with an introductory screen providing a summary of lockdown state and rules ⇒ **Everyone on the same page on lockdown basics, citizen categories, etc.**

▶ Introductory Screen to the Expectations Section (E)

> To fight the ongoing Coronavirus epidemic, the Government introduced stringent rules on social distancing. The rules came into effect on March 23, 2020, and identify "Stay at home" as the single most important action that citizens can take in fighting the Coronavirus. The police was given the powers to fully enforce the rules – including through fines and dispersing gatherings, as well as through arrests in case of failed compliance. The strictness of the social distancing rules differs somewhat, depending on whether someone belongs to a particular category (e.g. key worker).



▶ Followed by information on category-specific rules ( Rules ).

# Compliance Probs: Conceptualizing Non/Compliance

▶ We elicited respondents' **subjective probabilities of following each of a number of compliance conducts over the next month** (May 2020).

▶ To make things realistic while keeping them tractable, we allow **non/compliance to take the form of one of four conducts of behavior, or actions**.

(A1) **"Never Leave Home"** – Benchmark or status-quo conduct, corresponding to the government's "stay home" rule.

    ▶ Binding rule for vulnerables and self-isolating; strongly recommended to everyone else.

(A2) **"Strict Compliance"** – Conduct of those who closely follow the lockdown rules.

    ▶ Key workers and other non-vulnerables who were not self-isolating, (or after completing their quarantine), were allowed to leave home, but in a restricted manner and only for reasons specified by the lockdown rules.

(A3) **"General Compliance"** – Conduct of those who keep the main rules in mind but apply them with some discretion, leading to occasional non-compliance.

(A4) **"Non-Compliance"** – Conduct of those who carry on with their own life as much as possible without following the rules.

# Compliance Probabilities: Percent Chance Question

Between 0 and 100 percent, what are the chances that **you will take the following actions** *over the next 4 weeks*?

Please note: Your choices must add up to 100.

| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|

Action 1: You never leave home
`[                                    ]`  `0`

Action 2: You strictly follow all the rules that apply to you, exactly as described in the government's text
`[                                    ]`  `0`

Action 3: You generally follow the rules that apply to you, but with a little discretion (e.g., leaving home once or twice more than allowed for essential shopping)
`[                                    ]`  `0`

Action 4: You keep with your regular life and activities, using complete discretion in whether to follow or not the rules
`[                                    ]`  `0`

**Total:** **0**

# Compliance Probabilities: Percent Chance Question

Between 0 and 100 percent, what are the chances that **you will take the following actions** *over the next 4 weeks*?

Please note: Your choices must add up to 100.

| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

Action 1: You never leave home ⬚ 0

Action 2: You strictly follow all the rules that apply to you, exactly as described in the government's text ⬚ 0

Action 3: You generally follow the rules that apply to you, but with a little discretion (e.g., leaving home once or twice more than allowed for essential shopping) ⬚ 0

Action 4: You keep with your regular life and activities, using complete discretion in whether to follow or not the rules ⬚ 0

**Total:** **0**

# Compliance Probabilities: Percent Chance Question

Between 0 and 100 percent, what are the chances that **you will take the following actions** *over the next 4 weeks*?

Please note: Your choices must add up to 100.

| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

Action 1: You never leave home    `0`

Action 2: You strictly follow all the rules that apply to you, exactly as described in the government's text    `0`

Action 3: You generally follow the rules that apply to you, but with a little discretion (e.g., leaving home once or twice more than allowed for essential shopping)    `0`

Action 4: You keep with your regular life and activities, using complete discretion in whether to follow or not the rules    `0`

**Total:**      **0**

# Compliance Probabilities: Percent Chance Question

Between 0 and 100 percent, what are the chances that **you will take the following actions** *over the next 4 weeks*?

Please note: Your choices must add up to 100.

|  | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Action 1:** You never leave home — `[ 0 ]`

**Action 2:** You strictly follow all the rules that apply to you, exactly as described in the government's text — `[ 0 ]`

**Action 3:** You generally follow the rules that apply to you, but with a little discretion (e.g., leaving home once or twice more than allowed for essential shopping) — `[ 0 ]`

**Action 4:** You keep with your regular life and activities, using complete discretion in whether to follow or not the rules — `[ 0 ]`

**Total:** **0**

# Compliance Probabilities: Percent Chance Question

Between 0 and 100 percent, what are the chances that **you will take the following actions** *over the next 4 weeks*?

Please note: Your choices must add up to 100.

|  | 0 10 20 30 40 50 60 70 80 90 100 | |
|---|---|---|
| Action 1: You never leave home | | 0 |
| Action 2: You strictly follow all the rules that apply to you, exactly as described in the government's text | | 0 |
| Action 3: You generally follow the rules that apply to you, but with a little discretion (e.g., leaving home once or twice more than allowed for essential shopping) | | 0 |
| Action 4: You keep with your regular life and activities, using complete discretion in whether to follow or not the rules | | 0 |
| **Total:** | **0** | |

# Compliance Probabilities: Stats ( Hist )

| Actions | min | p10 | p25 | p50 | p75 | p90 | max | mean | sd | N |
|---|---|---|---|---|---|---|---|---|---|---|
| *1*-Never leave home | 0 | 0 | 0 | 10 | 38 | 75 | 100 | 22.25 | 29.39 | 1,132 |
| *2*-Strict compliance | 0 | 8 | 25 | 54.5 | 84.5 | 96 | 100 | 54.15 | 32.30 | 1,132 |
| *3*-General compliance | 0 | 0 | 0 | 10 | 28.5 | 55 | 100 | 19.31 | 24.37 | 1,132 |
| *4*-Non-compliance | 0 | 0 | 0 | 0 | 2 | 13 | 100 | 4.28 | 11.55 | 1,132 |

▶ Heterogeneity by: Vulnerable , Gender , Educ , IQ , Physical Health , Mental Health .

▶ **Some patterns within Rs across As**
  - Some non-compliance ($P3 > 0$ &/or $P4 > 0$): **72.26%** (49.57 V / 74.83 NV).
  - Discretion or non-compliance only ($P3 + P4 = 1$): **2.2%** (3.48 V / 2.07 NV).
  - Stay home or strictly comply ($P1 + P2 = 1$): **27.74%** (50.44 V / 25.17 NV).
  - Stay home only ($P1 = 1$): **3.18%** (18.26 Vulnerables / 1.47 Non-Vulnerables).

▶ Understanding of probability/familiarity with percent chance: Self-rated, mean = 78/100 and median = 83/100 ( Hist ).

▶ Interpretation of non-compliance: Most common .

# Perceptions of Corona-Related Risks: *List of Risks*

▶ Then we elicited respondents' **perceptions of a series of Coronavirus-related risks, unconditionally** (without specifying non/compliance scenarios).

▶ *List of Risks*:

1. PC of **contracting Coronavirus (w/ or w/o symptoms)** over the next 4 weeks.

2. PC of **developing No/ At most mild/ Severe-to-acute COVID-19 symptoms** requiring hospitalisation over the next 4 weeks, if were to contract Coronavirus.

   ▶ These sum to 100 percent.

3. PC of **not finding space in a hospital with ICU** over the next 4 weeks., **if were to develop COVID-19 with severe-to-acute symptoms**

4. PC of **COVID-19 being fatal** over the next 4 weeks., **if were to contract Coronavirus and develop COVID-19**.

5. Expected **fine (in GBP), if caught transgressing** over the next 4 weeks.

▶ More: Question , Means , Distribs

# Probs of Corona-Related Consequences of Non/Compliance: *Perceived Risks (of Non-Compliance)*

▶ Then we elicited **subjective probabilities for the same and additional events**, this time **under alternative compliance conducts (A1-A4)**.

▶ *"Risks" (of non-compliance)*:

1. PC of **contracting Coronavirus (w/ or w/o symptoms)** over the next 4 weeks.

   ▶ PC of **severe-to-acute COVID-19 symptoms requiring hospitalization** over the next 4 weeks, *if were to contract Coronavirus*.

   ▶ PC of **not finding space in a hospital with ICU** over the next 4 weeks, *if were to contract Coronavirus and develop COVID-19 with severe-to-acute symptoms*.

   ▶ PC of **COVID-19 being fatal** over the next 4 weeks, *if were to contract Coronavirus and develop COVID-19*.

2. PC of **infecting someone living with you** over the next 4 weeks.

3. PC of **infecting someone NOT living with you** over the next 4 weeks.

4. PC of **being caught transgressing** over the next 4 weeks.

   ▶ Expected **fine (in GBP)** over the next 4 weeks, *if caught transgressing*.

# Probs of Wellbeing-Related Consequences of Non/Compliance: *Perceived Benefits (of Non-Compliance)*

▶ *"Benefits" of (non-compliance)*:

1. PC of *not* **becoming unhappy or depressed**.

2. PC of *not* **gaining weight or becoming unfit**.

3. PC of *not* **worsening relationship with family, close friends, and/or close colleagues**.

4. PC of *not* **losing job** (if working)/ PC of *not* **falling behind with exams** (if studying).

5. PC of *not* **running out of money**.

▶ Note: "*Not*" framing for presentation; actually asked PC of complement events.

▶ Question Ex

# Perceived *Risks* of Non-Compliance:
## In Levels and *Relative to* "Never Leave Home" Graph

| | Never out home (A1) | Strict compl. (A2) | General compl. (A3) | Non-compl. (A4) | A2-A1 | A3-A1 | A4-A1 |
|---|---|---|---|---|---|---|---|
| PC of contracting Coronavirus over next month | 10.14 (18.65) | 19.61 (23.39) | 27.74 (21.15) | 54.35 (28.72) | 9.47 (17.81) | 17.60 (22.35) | 44.21 (35.71) |
| PC of infecting someone living w/ you over next month | 7.95 (17.98) | 15.38 (21.65) | 26.96 (22.69) | 52.56 (31.65) | 7.43 (15.94) | 19.01 (22.12) | 44.62 (35.48) |
| PC of infecting someone not living w/ you over next month | 4.71 (15.50) | 11.78 (19.51) | 22.32 (21.11) | 47.07 (30.83) | 7.07 (14.89) | 17.62 (21.62) | 42.36 (34.75) |
| PC of being caught transgressing | 0 | 0 | 15.31 (20.08) | 38.10 (31.56) | 0 | 15.31 (20.08) | 38.10 (31.56) |
| Expected fine if caught transgressing | 0 | 0 | 21.89 (54.83) | 51.17 (88.82) | 0 | 21.89 (54.83) | 51.17 (88.82) |

Note: PC=Percent Chance. N=1,132. Means and standard deviations (in parentheses). The last three columns display means of within-person differences.

# Perceived *Benefits* of Non-Compliance: In Levels and *Relative to* "Never Leave Home" Graph

| | Never out home (A1) | Strict compl. (A2) | General compl. (A3) | Non-compl. (A4) | A2-A1 | A3-A1 | A4-A1 |
|---|---|---|---|---|---|---|---|
| PC of not becoming unhappy or depressed over next month | 52.50 (34.63) | 62.90 (30.46) | 68.78 (26.08) | 73.90 (26.90) | 10.39 (20.44) | 16.28 (26.15) | 21.39 (36.30) |
| PC of not gaining weight or becoming unfit over next month | 48.33 (34.41) | 61.16 (30.39) | 67.33 (27.13) | 77.80 (22.78) | 12.82 (22.08) | 19.00 (25.42) | 29.47 (33.03) |
| PC of relationship not deteriorating over next month | 74.45 (30.58) | 77.49 (27.31) | 78.21 (24.35) | 74.03 (29.82) | 3.04 (14.02) | 3.76 (21.84) | -0.428 (37.48) |
| PC of not losing job (or falling behind w/ exams) | 81.26 (31.24) | 85.71 (25.41) | 86.25 (23.88) | 86.42 (23.67) | 4.45 (20.75) | 5.00 (22.73) | 5.16 (27.56) |
| PC of not running out of money over the next month | 81.27 (30.50) | 83.97 (26.92) | 85.12 (24.89) | 86.26 (23.64) | 2.71 (17.17) | 3.86 (19.38) | 5.00 (25.74) |

Note: PC=Percent Chance. N=1,132. Means and standard deviations (in parentheses). The last three columns display means of within-person differences.

# Simple Framework to Model Non/Compliance

Individuals face a **choice among a fine set of non/compliance behaviors**, $\mathcal{J}$, at some point in time, $t$ (suppressed).

- $\mathcal{J} \equiv \{A1, A2, A3, A4\}$, where: $A1 =$ Never leave home, $A2 =$ Strict compliance, $A3 =$ General compliance, and $A4 =$ Non-compliance.

Individuals are **forward looking**. Each individual, $i$, derives utility $U_i(\vec{\theta})$, where $\vec{\theta} = \{\theta_k\}_{k=1}^{K}$ is a finite vector of **consequences or outcomes**.

- E.g., whether will get infected, whether will become unhappy or depressed, etc.

Because elements of $\vec{\theta}$ are uncertain at choice, individual forms **subjective probabilities**, $\{P_{ij}(\vec{\theta})\}_{j \in \mathcal{J}}$, **over consequences of each alternative**, and then chooses the SEU-maximizing alternative $j_i^* \in \mathcal{J}$.

- Choice problem of person $i$ at the time of decision:

$$j_i^* = \arg \max_{j \in \mathcal{J}} \int U_i(\vec{\theta}) dP_{ij}(\vec{\theta})$$

# Simple Framework to Model Non/Compliance (Ctd.)

We assume **(i)** additive separability wrt the elements of $\vec{\theta}$; **(ii)** for each element of $\vec{\theta}$, multiplicative separability of probs and utilities.

Letting $\{b_k\}_{k=1}^{K_B}$ denote binary outcomes and $\{s_k\}_{k=1}^{K_S}$ continuous ones, person $i$'s choice problem becomes:

$$j_i^* = \arg\max_{j \in \mathcal{J}} \sum_{k=1}^{K_B} \left\{ P_{ij}(b_k = 1) \cdot u(b_k = 1) + \left[1 - P_{ij}(b_k = 1)\right] \cdot u(b_k = 0) \right\} + \sum_{k=1}^{K_S} \gamma_k \cdot E_{ij}(s_k)$$

$$= \arg\max_{j \in \mathcal{J}} \sum_{k=1}^{K_B} P_{ijk} \cdot \Delta u_k + \sum_{k=1}^{K_B} u(b_k = 0) + \sum_{k=1}^{K_S} \gamma_k \cdot E_{ijk},$$

where:

- $P_{ijk}$ is $i$'s subj prob that $b_k = 1$ will result (e.g. $i$ gets infected), if $j$ is chosen;
- $\Delta u_k$ is the (dis)utility $i$ derives from $b_k = 1$ (e.g. $i$ gets infected) relative to $b_k = 0$ (e.g. $i$ does not get infected) following *any choice*;
- $E_{ijk}$ is $i$'s subj expectation for $s_k$ (e.g. monetary fine), if $j$ is chosen;
- $\gamma_k$ represents the associated (dis)utility following *any choice*;
- $\sum_{k=1}^{N_B} u(b_k = 0)$ will drop out, as it is constant across alternatives.

# Problem *At* Time of Choice *vs Before* Choice

Form of problem *at the time* of actual choice:

$$j_i^* = \arg \max_{j \in \{A1, A2, A3, A4\}} \sum_{k=1}^{K_B} P_{ijk} \cdot \Delta u_k + \sum_{k=1}^{K_S} \gamma_k \cdot E_{ijk} + \varepsilon_{ij},$$

where $\varepsilon_{ij}$ is known to decision maker $i$, but unknown to the econometrician.

▶ Data on actual choices and on subjective expectations enable identification (in population) and estimation (in sample) of utility parameters, given assumptions on the distribution of unobservables.

Form of problem *at a time before* actual choice (e.g. **at survey**):

$$q_{i\tilde{j}} = Q_i \left[ \sum_{k=1}^{K_B} P_{i\tilde{j}k} \cdot \Delta u_k + \sum_{k=1}^{K_S} \gamma_k \cdot E_{i\tilde{j}k} + \epsilon_{i\tilde{j}} > \sum_{k=1}^{K_B} P_{ijk} \cdot \Delta u_k + \sum_{k=1}^{K_S} \gamma_k \cdot E_{ijk} + \epsilon_{ij} \quad \forall j \neq \tilde{j} \right],$$

▶ where $q_{i\tilde{j}} = i$'s subj prob of choosing action $\tilde{j}$ over the other actions;

▶ standard SEU as before *but* for $\epsilon_{ij}$, now including "resolvable uncertainty".

That is, $\epsilon_{ij} = \vartheta_{ij} + \xi_{ij}$, where:

  ● $\vartheta_{ij}$ known to $i$, but not to the econometrician (like $\varepsilon_{ij}$ above);
  ● $\xi_{ij}$ unknown to both $i$ and the econometrician, both holding (rational) beliefs about its distribution.

# Econometric Implementation and Empirical Specification

**Econometric implementation:** Assuming that $\xi_{ij}$ and $(\xi_{ij} + \vartheta_{ij})$ are each i.i.d. Type 1 Extreme Value, and inverting the choice probabilities, yields:

$$ln[q_{ij}] - ln[q_{i1}] = (\alpha_j - \alpha_1) + \sum_{k=1}^{K} \beta_k \cdot (p_{ijk} - p_{i1k}) + (\vartheta_{ij} - \vartheta_{i1})$$

$$= \alpha_j + \sum_{k=1}^{K} \beta_k \cdot \Delta p_{ik} + v_{ij}, \qquad (1)$$

where $j = 1$ (never leave home) is the reference action; $\alpha_1 = 0$; $\vec{\beta}$ includes the utility params $\Delta u_k$'s and $\gamma_k$'s to be estimated; $\vec{p}_{ij}$ includes expectations for all outcomes.

**Empirical specification:** Elements of $\{\Delta p_{ijk}\}_{k=1}^{K}$ are $i$'s perceived risks and returns of behaviors other than the recommended "stay home" *relative to* it. That is,

- $k = 1$: $\Delta$ subj prob of contracting Coronavirus if chose $j$ *vs* 1;
- ...
- $k = K$: $\Delta$ subj prob of not running out of money if chose $j$ *vs* 1. Detailed

**Estimation:** By LS (and LAD for robustness), using data on subjective probabilities over choices (LHS) and outcomes (RHS), $\{\{q_{ij}, \{p_{ijk}\}_{k=1}^{K}\}_{j=1}^{4}\}_{i=1}^{N}$.

# Baseline Estimates Without Heterogeneity

| $\beta_k$ | Exp. Sign | Estimate |
|---|:---:|:---:|
| ***Risks*** | | |
| $\beta_1$ (contract Coronavirus) | - | 0.465 (0.478) |
| $\beta_2$ (no ICU with acute COVID) | - | -1.343 (2.137) |
| $\beta_3$ (dying of COVID) | - | -1.958 (0.955)** |
| $\beta_4$ (infecting ppl living w/) | - | -1.774 (0.496)*** |
| $\beta_5$ (infecting ppl not living w/) | - | -1.750 (0.544)*** |
| $\beta_6$ (expected fine) | - | -0.009 (0.001)*** |
| ***Benefits*** | | |
| $\beta_7$ (not unhappy/depressed) | + | 1.357 (0.322)*** |
| $\beta_8$ (not unfit/gain weight) | + | 0.134 (0.365) |
| $\beta_9$ (no worse relationship) | + | 0.328 (0.322) |
| $\beta_{10}$ (not losing job) | + | 0.921 (0.438)** |
| $\beta_{11}$ (not running out of £) | + | -0.806 (0.529) |

Note: k=1: subjective probability of contracting Coronavirus; k=2: subj prob of not finding space in ICU after contracting Corona & getting COVID-19 w/ severe symptoms; k=3: subj prob of dying after contracting Coronavirus; k=4: subj prob of infecting someone living w/ you; k=5: subj prob of infecting someone not living w/ you; k=6: expected fine (weighted by subj proj of being caught transgressing); k=7: subj prob of not becoming unhappy/depressed; k=8: subj prob of not gaining weight/becoming unfit; k=9: subj prob of relationship not deteriorating; k=10: subj prob of not losing job (or falling behind w/ exams); k=11: subj prob of not running out of money. Standard errors clustered at the individual level in parentheses. ***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$.

# Heterogeneity in Expectations and Preferences: Summary

### By Gender

- ▶ Expectations: Men display lower perceived Coronavirus-related risks from leaving home and, in some cases, higher perceived returns to leaving home (avoid worsening relationship) than women.

- ▶ Preferences: Men assign larger disutilities to dying from COVID-19 and infecting people living with them, and a smaller utility to avoid losing their job (falling behind with exams), than women. And display fatalism about contracting the virus.

### By Vulnerability

- ▶ Expectations: Vulnerable individuals display significantly higher perceived Coronavirus-related risks from leaving home, and lower perceived wellbeing-related returns to leaving home.

- ▶ Preferences: Vulnerable individuals appear more concerned with physical health than with mental health consequences of social distancing. Overall, they display fewer trade-offs than non-vulnerable individuals.

Estimates: Exps , Prefs

# Group Decomposition of Compliance Probabilities: Expectations vs Preferences  More Het

| | Differences in Subjective Compliance Probabilities (Action $J$ vs Action 1) | |
| --- | --- | --- |
| | Male *VS* Female | Vulnerables *VS* Not |
| Share Expectations | 0.400*** | 0.137 |
| Share Preferences | 0.369*** | 0.869*** |

Note: Results from Oaxaca-Blinder decomposition.
***: $p<0.01$; **: $p<0.05$; *: $p<0.1$.

▶ Across genders differences in compliance probabilities are explained by both differences in expectations and preferences.

▶ Across vulnerability states differences in preferences seem the main source of variation explaining differences in compliance probabilities.

# How Much Compensation is Needed to Stay Home?

- We use an indifference condition from the model to compute the amount of money that makes each individual indifferent between their optimal choice and the recommended "stay home" (A1) ( Detail ).

- **35% of sample requires compensation** to be indifferent between never leaving home and their optimal choice.
  - ▶ Men are more likely to require compensation, vulnerables less likely.

- Mean compensation required is **£41 (over 4 weeks)**.
  - Median is £29.
  - $5^{th}$ percentile is £1.2.
  - $95^{th}$ percentile is £130.
  - Maximum is £332.

- We also directly asked respondents the amount of money that would make them 100% compliant. Median is **£100**.

- UK Gov scheme for the self-isolating on low income: initially trial amount of **£130** over 10 days for positive person (+ **£182** over 14 days for HH members), then increased to **£500** over 10 days.

# We Fielded a Flash Follow-up On May 28th, 2020

Back to Timeline

- **10 May 2020**: Johnson announces a conditional plan for lifting the lockdown, starting on June 1.
- **25 May 2020**: The "Cummings Scandal" reaches its peak with the Downing Street rose garden press conference.
- **28 May 2020**: Launch of NHS Test & Trace Service (TTS).

We Ran Our Follow-Up on the Day of the TTS Launch...

- Pretending it was about the NHS TTS: [FU Intro] [TT Q]

- In fact, we randomized a **negative sensitization treatment**, consisting of a screen reviewing the timeline of the "Cummings affair", to investigate malleability of expectations.
  - ▶ The treatment group saw the **'Cummings screen'** (negative prompt) at the beginning of the survey, the control group at the end. [Cumm Scr]

- We re-elicited compliance probabilities over the next 4 weeks, and asked a new TT question.
  - ▶ Baseline *vs* FU compliance probs: [Go to]

# Summary of Findings from Cummings Intervention

- We find that **reported compliance probabilities are sensitive to the negative prompt.**

    - Treated respondents reported a lower probability (-7.6pp) of A1 (never leave home) and a higher probability (+7.4pp) of A3 (general compliance), *but only if supporters of the Labour party.*

    - Treated respondents displayed a higher persistence of A3 prob (general compliance).

    - Estimates: FU Sample , Panel Sample

- Respondents also reported the Cummings event as a reason not to self-isolate if asked by TTS: Graph

# Thank You!

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# Bonus Slides

# Categories of Citizens

- Four categories of citizens were identified by the government's rules:

    1. **Self-isolating individuals or households**: People positive to Coronavirus or with COVID symptoms.

    2. **Vulnerables**: People aged 70+ and/or with certain health conditions; pregnant women.

    3. **Key workers**: People working in critical sectors (e.g. NHS).

    4. **Others**

- The first two categories were subject to the strictest rules, as they could not leave the house:

    - for 7 days (self-isolating individual) or 14 days (self-isolating household);

    - for 12 weeks (vulnerables).

# Detailed Timeline of UK Lockdowns  Back1 , Back2

**Timeline of UK coronavirus lockdowns, March 2020 to March 2021**                    IfG



**Upper timeline entries:**

**16 March** — PM says "now is the time for everyone to stop non-essential contact and travel"

**19 March** — PM says the UK can "turn tide of coronavirus" in 12 weeks

**23 March** — PM announces the first lockdown in the UK, ordering people to "stay at home"

**25 March** — Coronavirus Act 2020 gets Royal Assent

**26 March** — Lockdown measures legally come into force

**10 May** — PM announces a conditional plan for lifting lockdown, and says that people who cannot work from home should return to the workplace but avoid public transport

**4 July** — UK's first local lockdown comes into force in Leicester and parts of Leicestershire. More restrictions are eased including reopening of pubs, restaurants, hairdressers.

**16 July** — Local authorities in England gain additional powers to enforce social distancing

**14 September** — 'Rule of six' – indoor and outdoor social gatherings above six banned in England

**22 September** — PM announces new restrictions in England, including a return to working from home and 10pm curfew for hospitality sector

**30 September** — PM says UK at a "critical moment" in the crisis and would "not hesitate" to impose further restrictions if needed needed

**5 November** — Second national lockdown comes into force in England

**24 November** — PM announces up to three households will be able to meet up during during a five-day Christmas period of 23 to 27 December

**4 January** — PM says children should return to school after the Christmas break, but warns restrictions in England will get tougher

**6 January** — England enters third national lockdown

**Timeline axis:** March | April | May | June | July | August | September | October | November | 2021 December | January | February | March

**Lower timeline entries:**

**16 April** — Lockdown extended for 'at least' three weeks. Government sets out five tests that must be met before restrictions are eased

**30 April** — PM says "we are past the peak" of the pandemic

**1 June** — Phased re-opening of schools in England

**15 June** — Non-essential shops reopen in England

**23 June** — PM says UK's "national hibernation" coming to an end – announces relaxing of restrictions and 2m social distancing rule

**29 June** — Matt Hancock announces that the UK's first local lockdown would be applied in Leicester and parts of Leicestershire

**3 August** — Eat Out to Help Out scheme, offering a 50% discount on meals up to £10 per person, begins in the UK

**14 August** — Lockdown restrictions eased further, including reopening indoor theatres, bowling alleys and soft play

**14 October** — A new three-tier system of Covid-19 restrictions starts in England

**31 October** — PM announces a second national lockdown in England to prevent a "medical and moral disaster" for the NHS

**2 December** — Second lockdown ends after four weeks and England returns to a stricter three-tier system of restrictions

**13 December** — PM says Christmas rules will still be relaxed but urges the public to keep celebrations "short" and "small"

**19 December** — PM announces tougher restrictions for London and South East England, with a new Tier 4: 'Stay at Home' alert level. Christmas mixing rules tightened.

**21 December** — Tier 4 restrictions come into force in London and South East England

**26 December** — More areas of England enter tier 4 restrictions

**15 February** — Hotel quarantine for travellers arriving in England from 33 high-risk countries begins

**22 February** — PM expected to publish roadmap for lifting the lockdown

**8 March** — Planned return to school for primary and secondary school students in England

**Legend:** Lockdown / restrictions introduced | Lockdown restrictions eased | PM / government announcements | Legislation / emergency powers

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# Sample Characteristics at Baseline Survey Back

| | Mean | SD | N |
|---|---|---|---|
| Respondent is female | 0.504 | 0.500 | 1,127 |
| Age 18-29 | 0.188 | 0.391 | 1,132 |
| Age 30-39 | 0.172 | 0.378 | 1,132 |
| Age 40-49 | 0.191 | 0.393 | 1,132 |
| Age 50-59 | 0.168 | 0.374 | 1,132 |
| Age 60+ | 0.281 | 0.450 | 1,132 |
| White | 0.823 | 0.381 | 1,132 |
| UG Degree | 0.411 | 0.492 | 1,130 |
| PG Degree | 0.153 | 0.360 | 1,130 |
| Income <£16,000/year | 0.155 | 0.362 | 1,132 |
| Lives in England | 0.874 | 0.332 | 1,132 |
| Vulnerable | 0.102 | 0.302 | 1,132 |
| Self-Isolating | 0.152 | 0.359 | 1,132 |
| Key Worker | 0.163 | 0.370 | 1,132 |
| Other Working | 0.286 | 0.452 | 1,132 |
| Other Not Working | 0.285 | 0.452 | 1,132 |

Note: all variables are binary indicators.

▶ "Other, not working": Includes non-working students, retired, unemployed, on sick/other leave, unable to work, staying at home. 90 of these 323 Rs were working (without studying) in Feb 2020.

# More on Prolific Academic

- Information about Prolific Academic at `https://www.prolific.co/`.

- Age-gender-ethnicity representative for UK and US.

- High quality.
  - Peer et al. (2017) show that participants are less dishonest, are less likely to fail attention checks, and produce higher quality data than participants recruited via other comparable online research platforms.
  - Prolific versus M-Turk: `https://www.prolific.co/prolific-vs-mturk/`.

- Increasingly used in economics.
  - For instance, Akesson et al. (2020), Buso et al. (2020), Campos-Mercade et al. (2020), among others.

# Compliance Probs As Percent Chance: Histograms  Back



Data collected 3-10 May 2020 on Prolific.
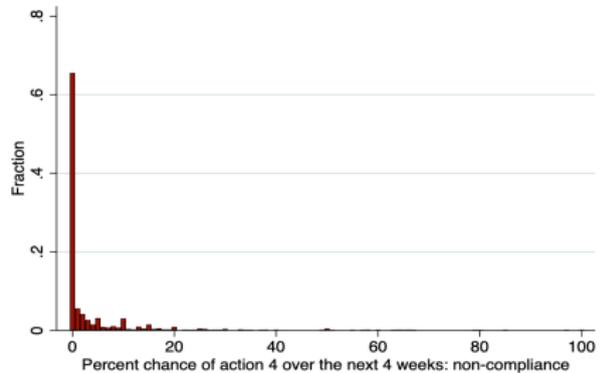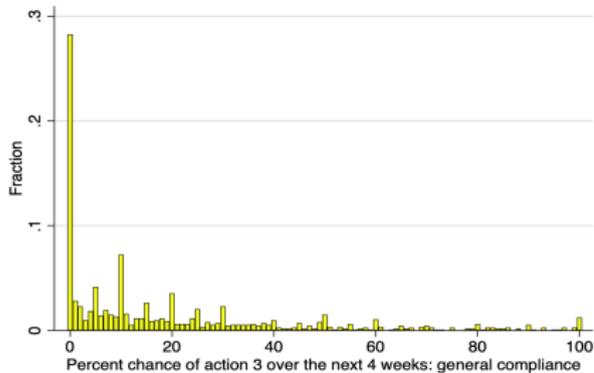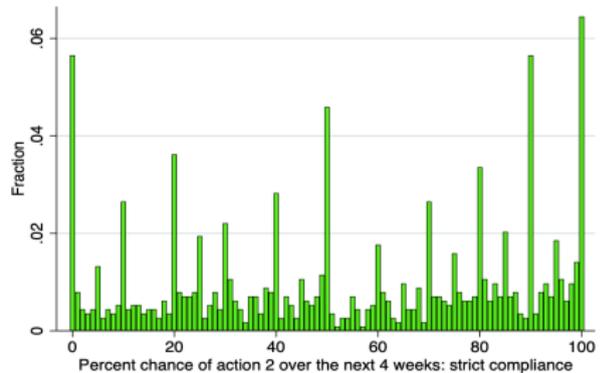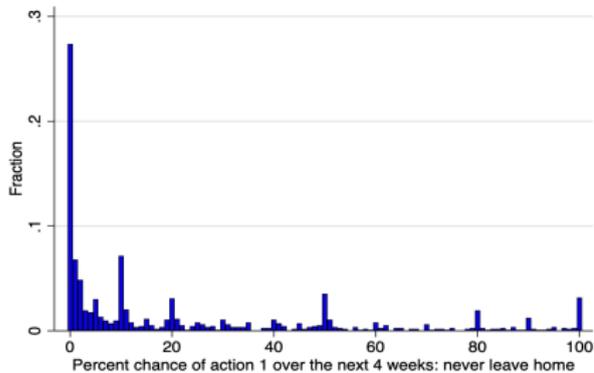
# Mean Compliance Probs by Gender



Bar chart legend:
- A1: Never leave home
- A2: Strict compliance
- A3: General compliance
- A4: Non-compliance

Male:
- A1: 20.9
- A2: 52.9
- A3: 20.9
- A4: 5.29

Female:
- A1: 23.6
- A2: 55.5
- A3: 17.6
- A4: 3.33
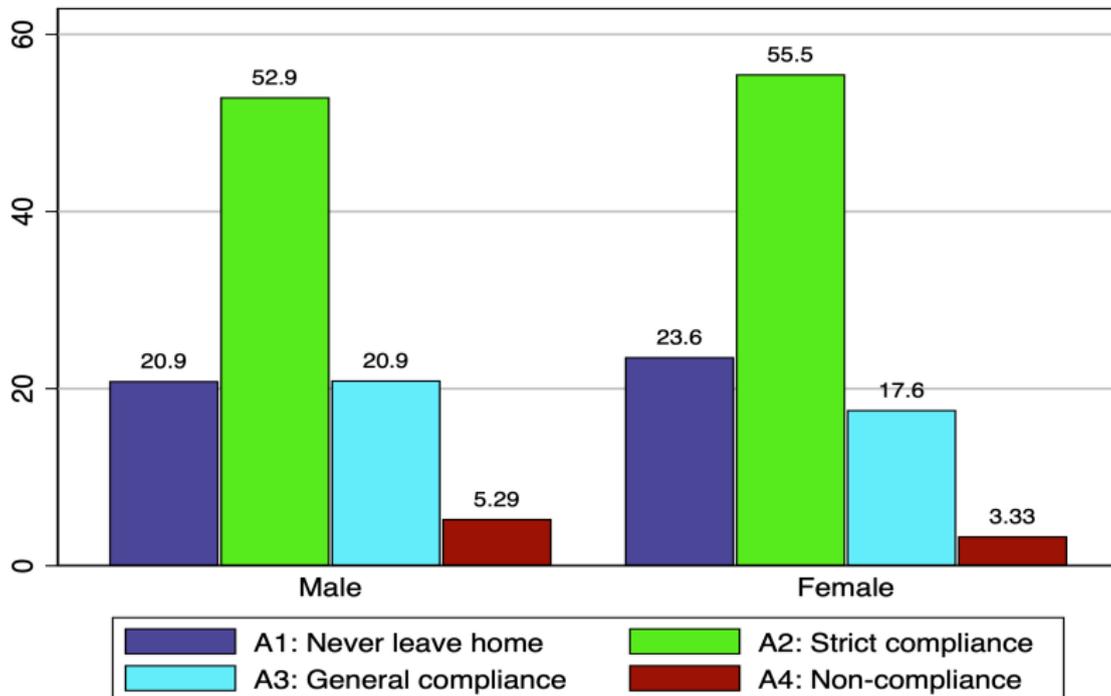
# Mean Compliance Probs by Education  Back
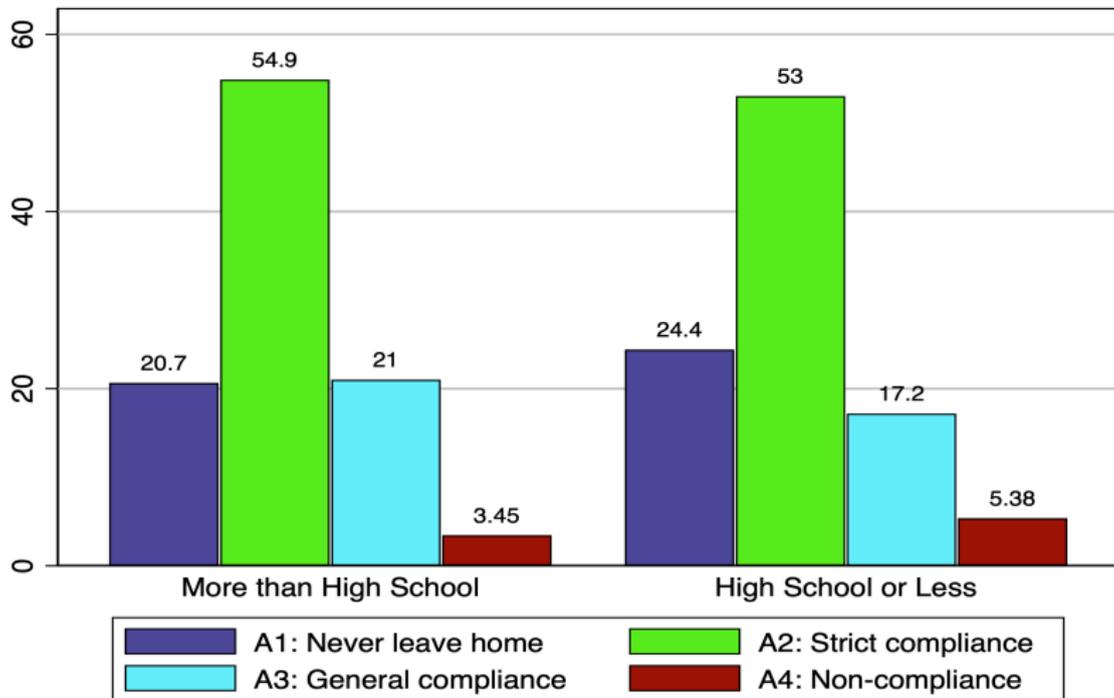
# Mean Compliance Probs by IQ Back
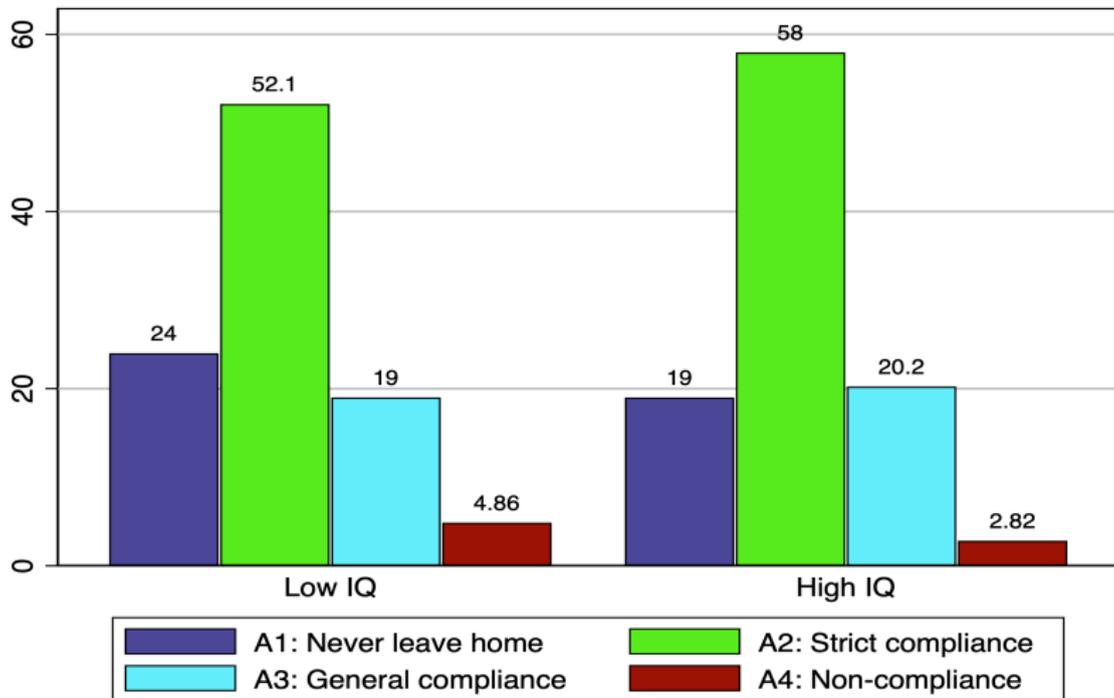
# Mean Compliance Probs by Vulnerability Status
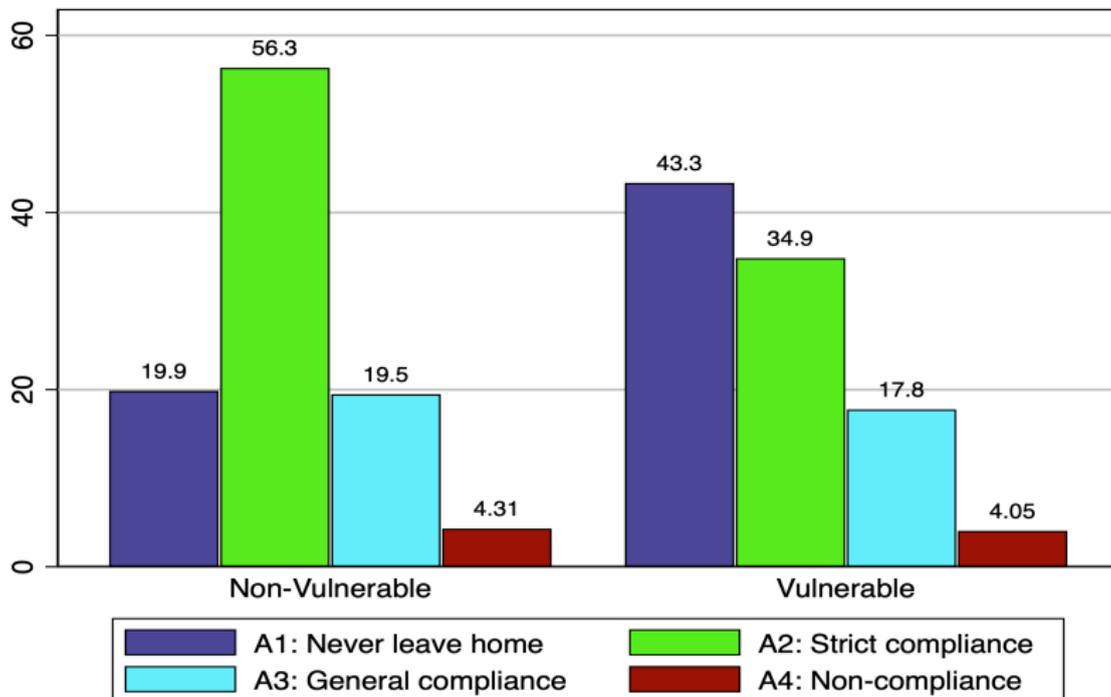
# Mean Compliance Probs by Physical Health Condition
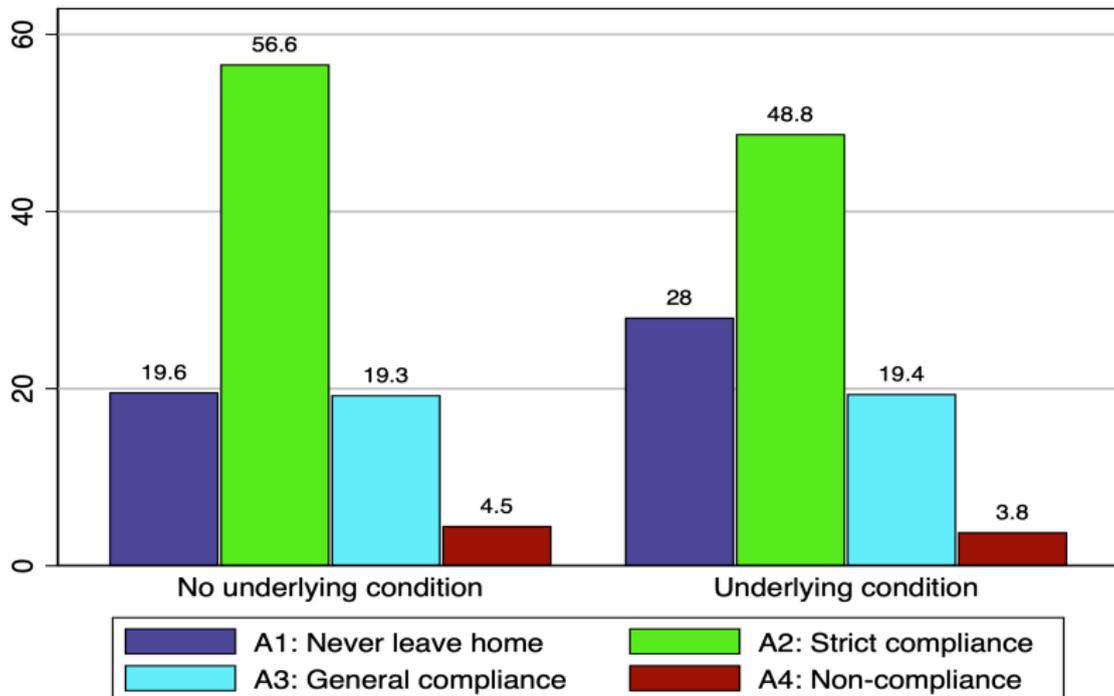
# Mean Compliance Probs by Mental Health Condition
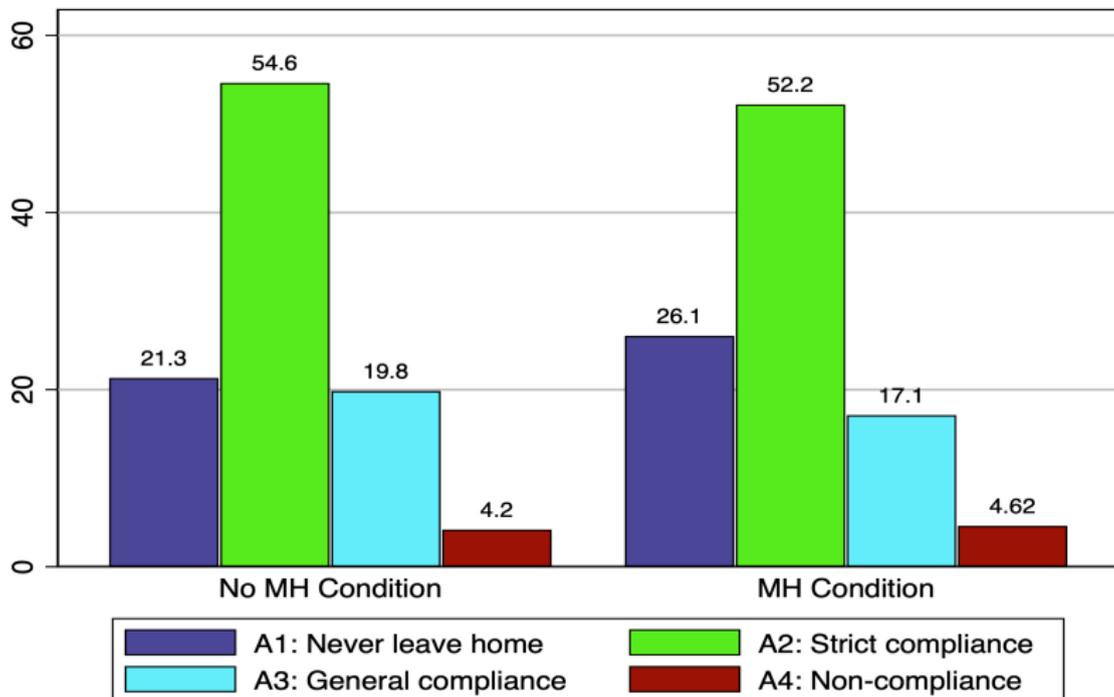
# Familiarity with Probabilities and Percent <sub>Back</sub>
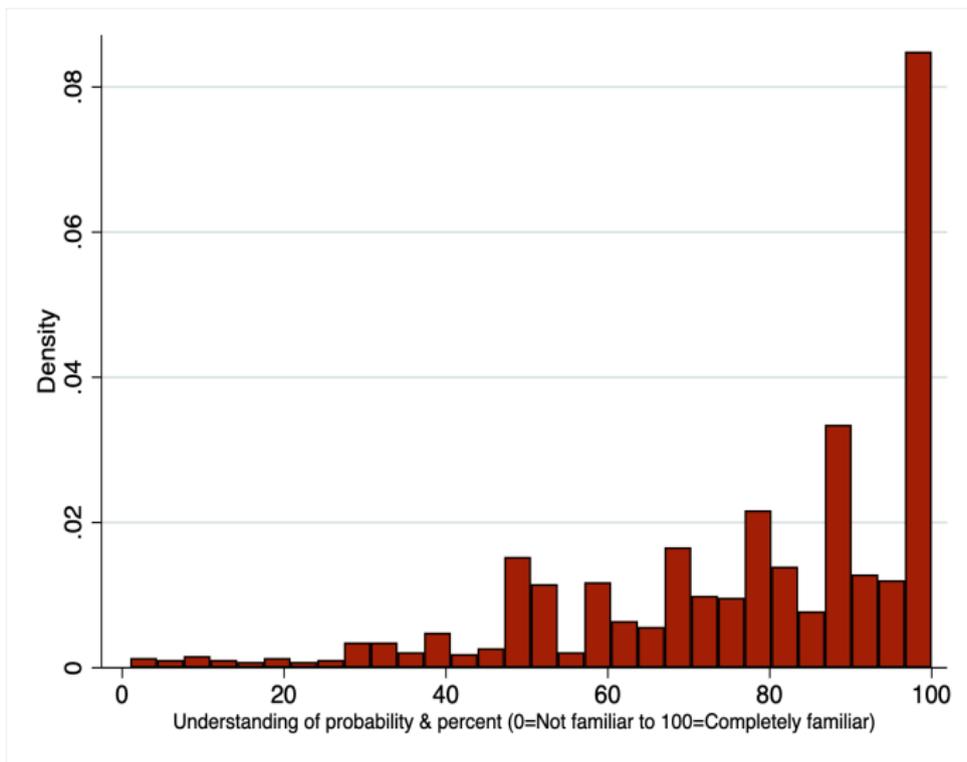


Note: Mean=78. Median=83.

# "What non-compliance behaviour did you think about?"

Note: N=1132. Bars display means. Data collected 3-10 May 2020 on Prolific.

Legend:
- Sunbathing
- Visiting relatives
- Going to second house
- Exercising >1/day
- Meeting friends

visiting scenic locations far from home

shopping

Travelling to beauty spots or outdoor parks

Just walking round built-up areas with no purpose

You didnt ask me this

Shopping for essential food; exercise half an hour a day

going to the beach for mental health/wellness reasons

going to a gathering, or going to the shops more than neccessary

shopping non essentials

Having parties, having people round to socialise

going to shops other than grocery kind

Meeting my partner who lives separately

None

None

Traveling somewhere far away to walk

Meeting my partner who lives 2 hours away from myself.

shop more than once

Going to Costco to buy items that are not strictly essential

Meeting up with girlfriend/boyfriend or going to each others house

Socialising at the park

Long drives, visit city

I didn't actually think of HOW I would fail to comply – I am actually happy to fully comply with the government's requirements (I believe it is good to be cooperative with the authorit...

Shopping for shoes

Seeing my young children whilst wearing a ffp3 facemask is the only thing I leave home for. Otherwise I do not leave or have contact with anyone.

I guess just a second inessential trip out (whilst social distancing) as feeling trapped but I am lucky to be in a sunny flat with lots of windows (no garden but am near trees and open...

Going out for exercise and subsequently going out again for a shop (don't think you're allowed out more than once a day)

Non essential shopping

None

going to the shop over the road, sometimes multiple times a day

been in car

Picnic

working

Eating out

Going to supermarkets more often than recommended

travelling / holidays

Going to see my partner, who lives 50 mies away and who I haven't seen for 7 weeks

Neighbours in a group together with their children/local youths present and music up load, good times had buy all!

Leaving the house for any 'non essential' reason

going to buy a car

Generally carrying on with life as normal before coronavirus and leaving home regularly for non essential reasons

Going to gym

I would and have fully complied

shopping

taking disabled son for a drive

None

Driving my daughter (a key worker) to work twice per week to avoid her using public transport.  Not very clear whether this is permitted, but I think it is in the spirit of the rules.

# Perceived Risks Related to Coronavirus as Percent Chance: Question Example Back

Between 0 and 100 percent, what are the chances that **you will contract the Coronavirus** (with or without developing symptoms) *over the next 4 weeks*?

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

Probability

# Mean Perceptions of Corona-Related Risks: Graph Back
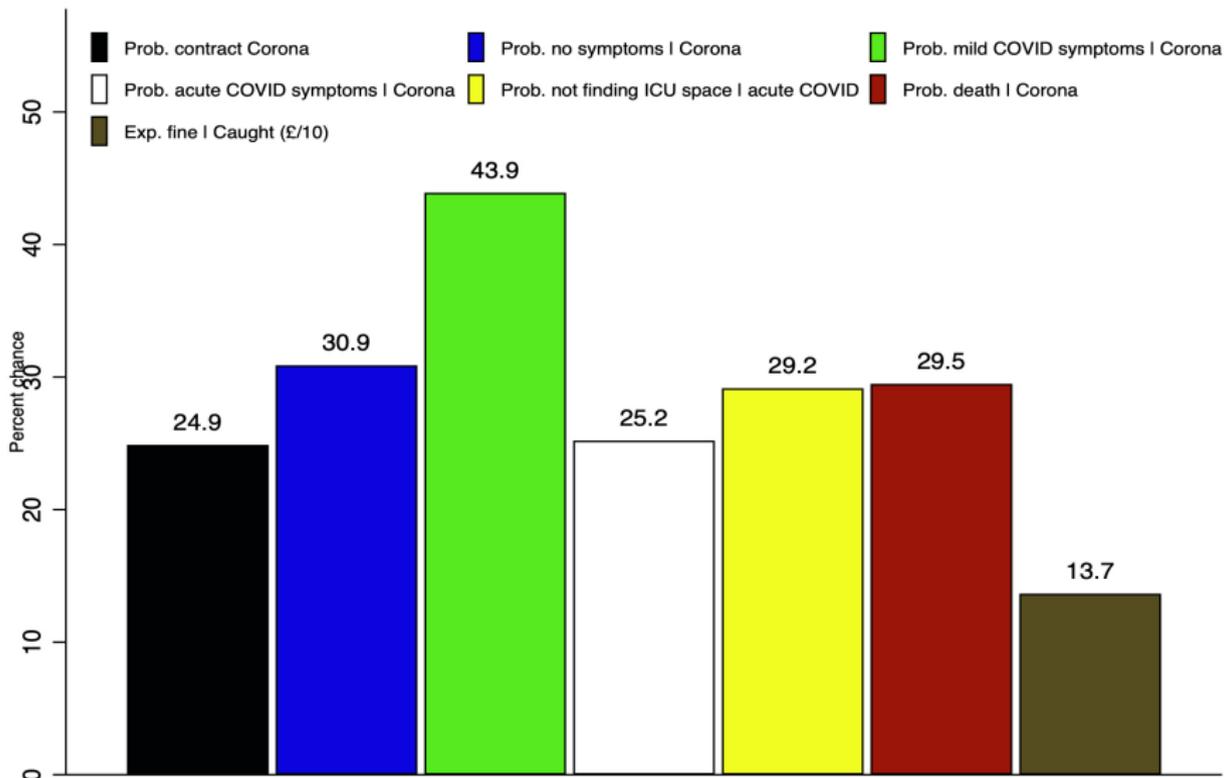


Note: N=1132. Bars display means. Data collected 3-10 May 2020 on Prolific.

# Heterogeneity in Perceptions of Corona-Rel Risks:  Table

| | min | p10 | p25 | p50 | p75 | p90 | max | mean | sd | N |
|---|---|---|---|---|---|---|---|---|---|---|
| PC that will contract Coronavirus | 0 | 3 | 9 | 20 | 40 | 51 | 100 | 24.89 | 21.07 | 1,132 |
| PC of developing no symptoms, if contract Coronavirus | 0 | 5 | 11 | 25 | 47.5 | 64 | 100 | 30.88 | 22.76 | 1,132 |
| PC of developing mild symptoms, if contract Coronavirus | 0 | 18 | 30 | 42 | 60 | 73 | 100 | 43.91 | 20.69 | 1,132 |
| PC of developing severe symptoms, if contract Coronavirus | 0 | 3 | 9 | 18 | 35.5 | 60 | 100 | 25.21 | 23.08 | 1,132 |
| PC of not finding space in ICU, if contract Coronavirus and severe symptoms | 0 | 0 | 7 | 20 | 49 | 71 | 100 | 29.15 | 27.16 | 1,132 |
| PC of dying, if contract Coronavirus | 0 | 3 | 8 | 20 | 50 | 70 | 100 | 29.48 | 25.76 | 1,132 |
| Expected fine (GBP) | 0 | 44 | 60 | 61 | 123.5 | 301 | 1,000 | 136.5 | 178.1 | 1,132 |

PC = Percent Chance.

For each action listed below, **what are the chances that you will contract Coronavirus (with or without developing symptoms)** *over the next 4 weeks*, if you were to take that action?

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

Action 1: You never leave home

Action 2: You strictly follow all the rules that apply to you, exactly as described in the government's text

Action 3: You generally follow the rules that apply to you, but with a little discretion (e.g., leaving home once or twice more than allowed for essential shopping)

Action 4: You keep with your regular life and activities, using complete discretion in whether to follow or not the rules

# Perceived *Risks* of Leaving Home: A4, A3, A2 *vs* A1



Legend:
- Contracting Corona, A4-A1
- Infecting ppl living w/ you, A4-A1
- Infecting ppl not living w/ you, A4-A1
- Being caught transgressing, A4-A1
- Expected fine (GBP), A3-A1
- Contracting Corona, A3-A1
- Infecting ppl living w/ you, A3-A1
- Infecting ppl not living w/ you, A3-A1
- Being caught transgressing, A3-A1
- Contracting Corona, A2-A1
- Infecting ppl living w/ you, A2-A1
- Infecting ppl not living w/ you, A2-A1
- Expected fine (GBP), A4-A1

Y-axis: Difference in the Percent Chance of Risk, A4, A3 or A2 vs. A1

Bar values: 44.2, 17.6, 9.5, 44.6, 19.0, 7.4, 42.4, 17.6, 7.1, 38.1, 15.3, 51.2, 21.9

Note: Each bar plots the difference in mean risk (in percent chance) in the next 4 weeks if the person does not comply (A4) or partially complies (A3) or strictly complies (A2) versus never leave home (A1). N=1132.
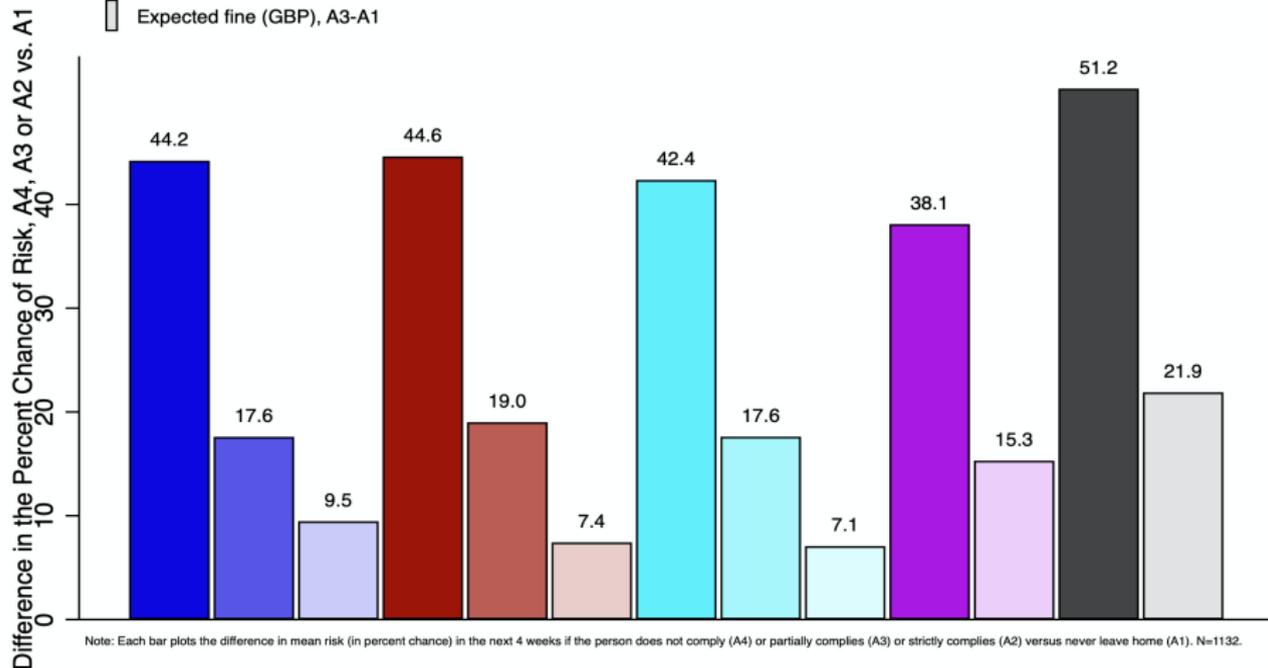
# Perceived *Benefits* of Leaving Home:  A4, A3, A2 *vs* A1  `Back`



Legend:
- Not becoming unhappy/depressed, A4-A1
- Not gaining weight/becoming unfit, A4-A1
- Not worsening relationships, A4-A1
- Not losing job/failing exams, A4-A1
- Not running out of money, A4-A1
- Not becoming unhappy/depressed, A3-A1
- Not gaining weight/becoming unfit, A3-A1
- Not worsening relationships, A3-A1
- Not losing job/failing exams, A3-A1
- Not running out of money, A3-A1
- Not becoming unhappy/depressed, A2-A1
- Not gaining weight/becoming unfit, A2-A1
- Not worsening relationships, A2-A1
- Not losing job/failing exams, A2-A1
- Not running out of money, A2-A1

Y-axis: Difference in the Percent Chance of Return, A4, A3 or A2 vs. A1

Bar values: 21.4, 16.3, 10.4, 29.5, 19.0, 12.8, -0.4, 3.8, 3.0, 5.2, 5.0, 4.5, 5.0, 3.9, 2.7
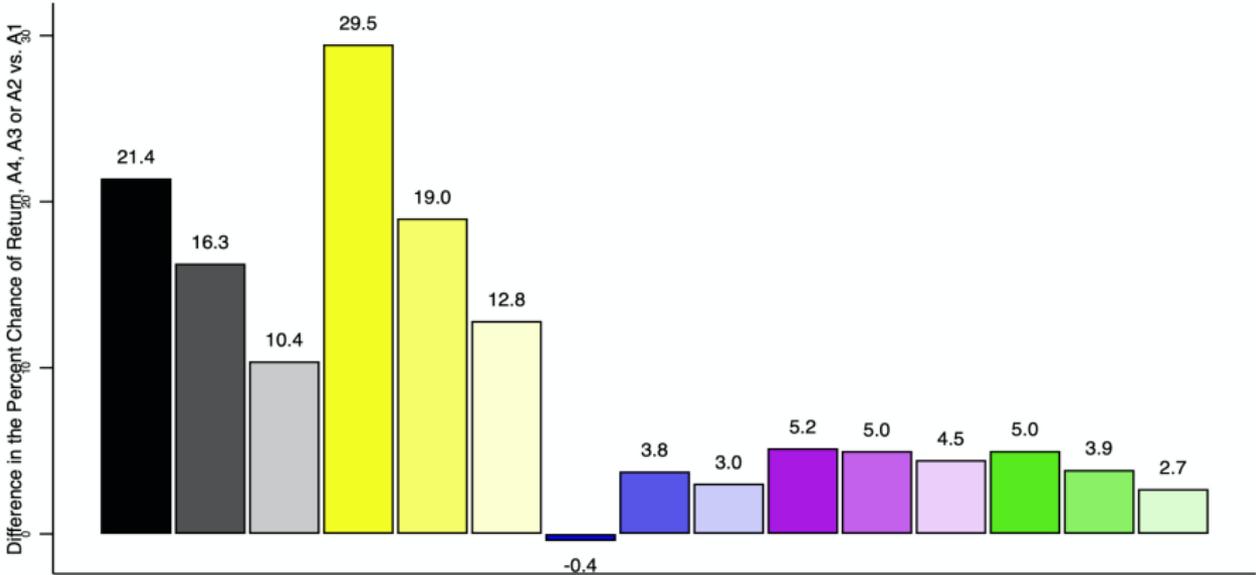
Note: Each bar plots the difference in mean return (in percent chance) in the next 4 weeks if the person does not comply (A4) or partially complies (A3) or strictly complies (A2) versus never leave home (A1). N=1132.

# Empirical Specification in More Detail

- $k = 1$: Probability that $i$ will contract the Coronavirus following $j$, $P_{ij}(\text{Corona})$;

- $k = 2$: Probability that $i$ will not find ICU space in the hospital while needing hospitalization due to the complications of COVID following $j$,
  $P_i(\text{no ICU space}|\text{acute COVID, Corona}) \times P_i(\text{acute COVID}|\text{Corona}) \times P_{ij}(\text{Corona})$;

- $k = 3$: Probability that $i$ will pass away for COVID following $j$,
  $P_i(\text{dying of COVID}|\text{Corona}) \times P_{ij}(\text{Corona})$;

- $k = 4$: Probability that $i$ will infect people with whom she lives following $j$, $P_{ij}(\text{Infecting ppl leaving w/})$;

- $k = 5$: Probability that $i$ will infect people she does not live with following $j$,
  $P_{ij}(\text{Infecting ppl not leaving w/})$;

- $k = 6$: Expected monetary fine that $i$ will receive following $j$, $E_i(\text{fine}|\text{caught}) \times P_{ij}(\text{caught})$;

- $k = 7$: Probability that $i$ will *not* become unhappy or depressed following $j$, $1 - P_{ij}(\text{Depressed})$;

- $k = 8$: Probability that $i$ will *not* gain weight or become unfit following $j$,
  $1 - P_{ij}(\text{Gain weight/become unfit})$;

- $k = 9$: Probability that $i$'s relationships with family and close friends or colleagues will *not* deteriorate following $j$, $1 - P_{ij}(\text{Worse relationships})$;

- $k = 10$: Probability that $i$ will *not* lose her job following $j$, $1 - P_{ij}(\text{Lose job})$ (for working $i$'s) / will *not* fall behind with exams following $j$, $1 - P_{ij}(\text{Fall behind with exams})$ (for studying $i$'s);

- $k = 11$: Probability that $i$ will *not* run out of money following $j$, $1 - P_{ij}(\text{Run out of } \pounds)$.

# Estimates: With Observed Heterogeneity Back , More Het

| | Female | Male | Other | Vunerable |
|---|---|---|---|---|
| **Risks** | | | | |
| $\beta_{1(\text{contract Coronavirus})}$ | -0.221 | 1.303** | 0.391 | -3.009 |
| | (0.663) | (0.663) | (0.497) | (1.870) |
| $\beta_{2(\text{no ICU with acute COVID})}$ | -0.714 | -2.075 | -1.143 | 1.370 |
| | (2.641) | (3.608) | (2.585) | (3.238) |
| $\beta_{3(\text{dying of COVID})}$ | -1.109 | -3.130** | -1.993* | 2.906 |
| | (1.239) | (1.432) | (1.065) | (2.372) |
| $\beta_{4(\text{infecting ppl living w/})}$ | -1.143 | -2.542*** | -1.296*** | -3.567** |
| | (0.697) | (0.645) | (0.500) | (1.525) |
| $\beta_{5(\text{infecting ppl not living w/})}$ | -1.898*** | -1.494** | -2.409*** | 1.796 |
| | (0.736) | (0.748) | (0.544) | (1.314) |
| $\beta_{6(\text{expected fine})}$ | -0.007*** | -0.012*** | -0.009*** | -0.009** |
| | (0.002) | (0.002) | (0.001) | (0.005) |
| **Benefits** | | | | |
| $\beta_{7(\text{not depressed})}$ | 1.225*** | 1.593*** | 1.383*** | 1.324 |
| | (0.424) | (0.482) | (0.334) | (1.076) |
| $\beta_{8(\text{not unfit/gaining weight})}$ | -0.028 | 0.339 | -0.196 | 1.656* |
| | (0.486) | (0.526) | (0.381) | (0.946) |
| $\beta_{9(\text{no worse relationship})}$ | 0.219 | 0.341 | 0.154 | 1.878 |
| | (0.465) | (0.459) | (0.339) | (1.170) |
| $\beta_{10(\text{not losing job})}$ | 1.233** | 0.549 | 0.908** | -0.374 |
| | (0.592) | (0.644) | (0.438) | (2.591) |
| $\beta_{11(\text{not running out of £})}$ | -0.613 | -1.062 | -0.800 | -1.138 |
| | (0.696) | (0.809) | (0.529) | (2.290) |

Note: Each column reports estimated coefficients from equation (1) on a subsample.
Standard errors clustered at the individual level in parentheses.
***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$.

| | Subjective probability of [...] if Action J vs Action 1 (=Never Leave Home) | | | | | Expected fine |
|---|---|---|---|---|---|---|
| | | | *Risks* | | | |
| | (1) Contract Coronavirus | (2) No ICU with acute COVID | (3) Dying of COVID | (4) Infecting ppl living w/ you | (5) Infecting ppl not living w/ u | (6) |
| Male | -0.043*** (0.012) | -0.004 (0.002) | -0.020*** (0.006) | -0.055*** (0.012) | -0.048*** (0.012) | -2.198 (2.565) |
| Vulnerable | -0.024 (0.019) | 0.015*** (0.005) | 0.062*** (0.015) | 0.020 (0.018) | -0.023 (0.020) | -0.833 (4.085) |

| | *Returns* | | | | |
|---|---|---|---|---|---|
| | (7) Not feeling depressed | (8) Not becoming unfit | (9) Not worsening relations | (10) Not losing job | (11) Not running out of £ |
| Male | 0.015 (0.015) | -0.001 (0.015) | 0.037*** (0.013) | -0.005 (0.013) | -0.000 (0.011) |
| Vulnerable | -0.106*** (0.022) | -0.121*** (0.019) | -0.094*** (0.019) | -0.056*** (0.013) | -0.042*** (0.012) |

Note: Each cell reports the estimated coefficient from a separate regression of an outcome on the variable listed in the first column. The outcome in columns (1)-(5) in the top (bottom) is the subjective probability of the risk (benefit) in the top row if Action $j$ versus Action 1 (= Never Leave Home). The outcome in column (6) is the expected fine. Standard errors clustered at the individual level in parentheses. ***: $p<0.01$; **: $p<0.05$; *: $p<0.1$.

## More Estimates: With Observed Heterogeneity

| | Female | Male | High Educ. | Low Educ. | Low IQ | High IQ |
|---|---|---|---|---|---|---|
| **Risks** | | | | | | |
| $\beta_{1(\text{contract Coronavirus})}$ | -0.221 | 1.303** | 0.701 | -0.016 | 0.838 | -0.705 |
| | (0.663) | (0.663) | (0.668) | (0.661) | (0.609) | (0.716) |
| $\beta_{2(\text{no ICU with acute COVID})}$ | -0.714 | -2.075 | -0.270 | -1.918 | -2.648 | 1.123 |
| | (2.641) | (3.608) | (2.980) | (2.678) | (2.768) | (2.873) |
| $\beta_{3(\text{dying of COVID})}$ | -1.109 | -3.130** | -2.794** | -0.838 | -1.636 | -2.856** |
| | (1.239) | (1.432) | (1.331) | (1.274) | (1.232) | (1.392) |
| $\beta_{4(\text{infecting ppl living w/})}$ | -1.143 | -2.542*** | -0.963 | -2.480*** | -1.861*** | -1.430* |
| | (0.697) | (0.645) | (0.690) | (0.651) | (0.624) | (0.865) |
| $\beta_{5(\text{infecting ppl not living w/})}$ | -1.898*** | -1.494** | -3.284*** | -0.246 | -1.256* | -2.865*** |
| | (0.736) | (0.748) | (0.678) | (0.727) | (0.680) | (0.767) |
| $\beta_{6(\text{expected fine})}$ | -0.007*** | -0.012*** | -0.008*** | -0.010*** | -0.011*** | -0.005*** |
| | (0.002) | (0.002) | (0.001) | (0.002) | (0.002) | (0.001) |
| **Benefits** | | | | | | |
| $\beta_{7(\text{not depressed})}$ | 1.225*** | 1.593*** | 1.534*** | 1.051** | 1.195*** | 1.401*** |
| | (0.424) | (0.482) | (0.415) | (0.483) | (0.437) | (0.495) |
| $\beta_{8(\text{not unfit/gaining weight})}$ | -0.028 | 0.339 | 0.337 | -0.063 | -0.294 | 1.047* |
| | (0.486) | (0.526) | (0.455) | (0.588) | (0.463) | (0.565) |
| $\beta_{9(\text{no worse relationship})}$ | 0.219 | 0.341 | 0.799** | -0.529 | 0.192 | 0.880* |
| | (0.465) | (0.459) | (0.391) | (0.538) | (0.427) | (0.488) |
| $\beta_{10(\text{not losing job})}$ | 1.233** | 0.549 | 0.652 | 1.379** | 0.818 | 1.445** |
| | (0.592) | (0.644) | (0.614) | (0.572) | (0.554) | (0.698) |
| $\beta_{11(\text{not running out of £})}$ | -0.613 | -1.062 | -0.677 | -0.436 | -0.684 | 0.032 |
| | (0.696) | (0.809) | (0.718) | (0.719) | (0.701) | (0.732) |

Note: Each column reports estimated coefficients from equation (1) on the specific subsample.
High Education=more than A-level (high school); Low Education=at most A-Level (high school).
Low/High IQ=below/above the median of the Raven score.
Standard errors clustered at the individual level in parentheses. ***: $p<0.01$; **: $p<0.05$; *: $p<0.1$.

# More Estimates: With Observed Heterogeneity (Ctd.) <sub>Back</sub>

| | Other | Vulnerable | No Cond. | PH Condition | No Cond. | MH Condition |
|---|---|---|---|---|---|---|
| **Risks** | | | | | | |
| $\beta_{1(contract\ Coronavirus)}$ | 0.391 | -3.009 | 0.345 | 0.467 | 0.580 | 0.157 |
| | (0.497) | (1.870) | (0.571) | (0.939) | (0.535) | (0.955) |
| $\beta_{2(no\ ICU\ with\ acute\ COVID)}$ | -1.143 | 1.370 | -4.076* | 1.397 | -1.992 | 1.143 |
| | (2.585) | (3.238) | (2.426) | (3.131) | (2.558) | (3.608) |
| $\beta_{3(dying\ of\ COVID)}$ | -1.993* | 2.906 | -2.056 | -1.329 | -2.258** | -1.160 |
| | (1.065) | (2.372) | (1.318) | (1.560) | (1.104) | (1.771) |
| $\beta_{4(infecting\ ppl\ living\ w/)}$ | -1.296*** | -3.567** | -1.733*** | -1.667** | -1.566*** | -2.537*** |
| | (0.500) | (1.525) | (0.587) | (0.849) | (0.593) | (0.756) |
| $\beta_{5(infecting\ ppl\ not\ living\ w/)}$ | -2.409*** | 1.796 | -1.944*** | -1.250 | -1.633** | -2.101** |
| | (0.544) | (1.314) | (0.619) | (1.082) | (0.650) | (0.983) |
| $\beta_{6(expected\ fine)}$ | -0.009*** | -0.009** | -0.007*** | -0.018*** | -0.008*** | -0.014*** |
| | (0.001) | (0.005) | (0.001) | (0.003) | (0.001) | (0.003) |
| **Benefits** | | | | | | |
| $\beta_{7(not\ depressed)}$ | 1.383*** | 1.324 | 1.503*** | 1.229* | 1.291*** | 1.702*** |
| | (0.334) | (1.076) | (0.371) | (0.635) | (0.373) | (0.625) |
| $\beta_{8(not\ unfit/gaining\ weight)}$ | -0.196 | 1.656* | -0.285 | 0.981 | 0.156 | 0.152 |
| | (0.381) | (0.946) | (0.440) | (0.636) | (0.404) | (0.878) |
| $\beta_{9(no\ worse\ relationship)}$ | 0.154 | 1.878 | 0.021 | 0.944* | 0.294 | 0.508 |
| | (0.339) | (1.170) | (0.401) | (0.532) | (0.360) | (0.680) |
| $\beta_{10(not\ losing\ job)}$ | 0.908** | -0.374 | 1.016* | 0.422 | 1.051** | 0.412 |
| | (0.438) | (2.591) | (0.518) | (0.798) | (0.521) | (0.684) |
| $\beta_{11(not\ running\ out\ of\ \pounds)}$ | -0.800 | -1.138 | -0.672 | -1.747 | -1.106* | 0.212 |
| | (0.529) | (2.290) | (0.595) | (1.223) | (0.610) | (1.013) |

Note: Each column reports estimated coefficients from equation (1) on the specific subsample.
PH=Physical Health; MH=Mental Health.
Standard errors clustered at the individual level in parentheses. ***: $p<0.01$; **: $p<0.05$; *: $p<0.1$.

# How About Belief Heterogeneity? *Risks* <span style="background:#b3b3d9">Back</span>

| | Subjective probability of [...] if Action J vs Action 1 (=Never Leave Home) | | | | | Expected fine |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | Contract Coronavirus | No ICU with acute COVID | Dying of COVID | Infecting ppl living w/ you | Infecting ppl not living w/ u | |
| Male | -0.043*** | -0.004 | -0.020*** | -0.055*** | -0.048*** | -2.198 |
| | (0.012) | (0.002) | (0.006) | (0.012) | (0.012) | (2.565) |
| Low Education | -0.014 | -0.001 | 0.010 | -0.004 | 0.008 | 5.258** |
| | (0.012) | (0.002) | (0.007) | (0.012) | (0.012) | (2.623) |
| High IQ | 0.018 | 0.001 | -0.006 | 0.018 | 0.025** | 2.478 |
| | (0.012) | (0.002) | (0.006) | (0.012) | (0.012) | (2.662) |
| Vulnerable | -0.024 | 0.015*** | 0.062*** | 0.020 | -0.023 | -0.833 |
| | (0.019) | (0.005) | (0.015) | (0.018) | (0.020) | (4.085) |
| PH Condition | -0.014 | 0.006** | 0.047*** | 0.010 | -0.008 | -4.408* |
| | (0.013) | (0.003) | (0.008) | (0.013) | (0.012) | (2.453) |
| MH Condition | 0.043*** | 0.005 | 0.018** | 0.046*** | 0.042*** | 0.179 |
| | (0.015) | (0.003) | (0.009) | (0.014) | (0.014) | (2.957) |

Note: Each cell reports the estimated coefficient from a separate regression of an outcome on the variable listed in the first column. The outcome in columns (1)-(5) is the subjective probability of the risk indicated in the top row if Action $j$ versus Action 1 (=Never Leave Home). The outcome in column (6) is the expected fine. High IQ=above the median of the Raven score; PH=Physical Health; MH=Mental Health. Standard errors clustered at the individual level in parentheses. ***: $p<0.01$; **: $p<0.05$; *: $p<0.1$.

# How About Belief Heterogeneity? *Returns* Back

| | Subjective probability of [...] if Action J vs Action 1 (=Never Leave Home) | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| | Not feeling depressed | Not becoming unfit | Not worsening relations | Not losing job | Not running out of £ |
| Male | 0.015 | -0.001 | 0.037*** | -0.005 | -0.000 |
| | (0.015) | (0.015) | (0.013) | (0.013) | (0.011) |
| Low Education | -0.024* | -0.022 | -0.004 | -0.020 | -0.003 |
| | (0.014) | (0.015) | (0.012) | (0.013) | (0.011) |
| High IQ | 0.019 | 0.009 | 0.005 | -0.012 | -0.011 |
| | (0.015) | (0.015) | (0.013) | (0.013) | (0.011) |
| Vulnerable | -0.106*** | -0.121*** | -0.094*** | -0.056*** | -0.042*** |
| | (0.022) | (0.019) | (0.019) | (0.013) | (0.012) |
| PH Condition | -0.049*** | -0.029* | -0.033** | -0.043*** | -0.035*** |
| | (0.015) | (0.015) | (0.014) | (0.013) | (0.011) |
| MH Condition | 0.009 | -0.003 | -0.012 | -0.020 | -0.012 |
| | (0.019) | (0.018) | (0.017) | (0.016) | (0.014) |

Note: Each cell reports the estimated coefficient from a separate regression of an outcome on the variable listed in the first column. The outcome in columns (1)-(5) is the subjective probability of the benefit indicated in the top row if Action $j$ versus Action 1 (=Never Leave Home).
High IQ=above the median of the Raven score; PH=Physical Health; MH=Mental Health.
Standard errors clustered at the individual level in parentheses. ***: p<0.01; **: p<0.05; *: p<0.1.

## Group Decomposition of Compliance Probabilities: Expectations *vs* Preferences Back

| | Differences in Subjective Probabilities of Compliance (Action $J$ vs Action 1) between... | | | | | |
|---|---|---|---|---|---|---|
| | Male & Female | Low & High Educ | Low & High IQ | Vulnerables & Not | PH Condition & No PH | MH Condition & No MH |
| Share Expectations | 0.400*** | 0.220* | -0.143 | 0.137 | 0.087 | 0.344** |
| Share Preferences | 0.369*** | 0.630 | 1.087*** | 0.869*** | 0.754*** | 0.737** |
| Share Unexplained | 0.231 | 0.150 | 0.056 | -0.006 | 0.159 | -0.080 |

Note: Results from Oaxaca-Blinder decomposition. ***: $p<0.01$; **: $p<0.05$; *: $p<0.1$.

# We Compute the Compensation Needed to Stay Home Back

Building on Delavande (2008), we compute the amount of money that makes each individual indifferent between their optimal choice ($j^*$) and the recommended "stay home" one ($j = 1$).

$$M_i^{Ind}(j_i^*, 1) = \sum_{k=1}^{11} \left( p_{ij^*k} - p_{i1k} \right) \times \beta_k / \beta_6.$$
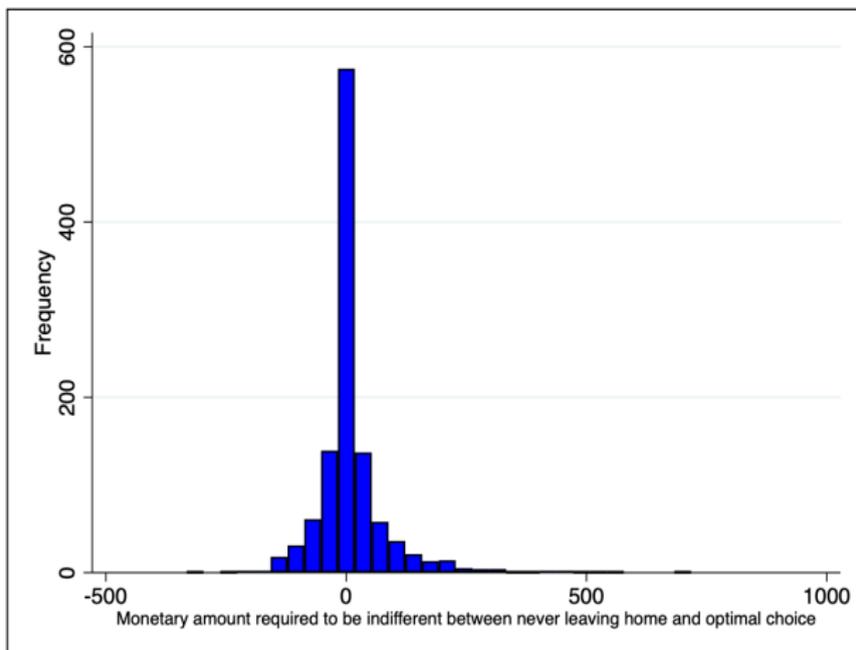
## Who Needs Compensation?

| | Dep. Var. = Needs Compensation (M<0) | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Male | 0.0479* | 0.0496* | 0.0541* | 0.0420 |
| | (0.0286) | (0.0286) | (0.0288) | (0.0283) |
| Age <50 | 0.0284 | -0.00261 | -0.00251 | 0.0161 |
| | (0.0292) | (0.0301) | (0.0315) | (0.0310) |
| White | 0.0864** | 0.0868** | 0.0902** | 0.0558 |
| | (0.0381) | (0.0379) | (0.0381) | (0.0377) |
| Income Loss | | 0.0444 | 0.0403 | 0.0340 |
| | | (0.0297) | (0.0299) | (0.0293) |
| Self-Isolating (ref. Vulnerable) | | 0.119** | 0.106* | 0.0907 |
| | | (0.0592) | (0.0609) | (0.0598) |
| Key Worker (ref. Vulnerable) | | 0.232*** | 0.205*** | 0.123** |
| | | (0.0587) | (0.0614) | (0.0614) |
| Other Working (ref. Vulnerable) | | 0.199*** | 0.180*** | 0.123** |
| | | (0.0534) | (0.0567) | (0.0562) |
| Not Working (ref. Vulnerable) | | 0.205*** | 0.191*** | 0.147*** |
| | | (0.0528) | (0.0554) | (0.0547) |
| DK Group (ref. Vulnerable) | | 0.212 | 0.196 | 0.193 |
| | | (0.140) | (0.141) | (0.138) |
| Conservative Party Affiliation | | | 0.0499 | 0.0368 |
| | | | (0.0328) | (0.0322) |
| Had COVID Symptoms since February | | | 0.0714** | 0.0645** |
| | | | (0.0288) | (0.0283) |
| COVID Risk Factor | | | -0.0394 | -0.0285 |
| | | | (0.0348) | (0.0341) |
| Mental Health Problem | | | 0.0517 | 0.0416 |
| | | | (0.0331) | (0.0324) |
| # days spent outdoor last week | | | | 0.0394*** |
| | | | | (0.00581) |
| Observations | 1,118 | 1,118 | 1,118 | 1,118 |
| R-squared | 0.008 | 0.029 | 0.039 | 0.077 |

# Follow-Up Intro Screen

Hi!

You are receiving this follow-up because you recently took part in the study "Coronavirus and Risk in the UK". Your answers have been very helpful to us to study the perceived risk of coronavirus and the costs and benefits of the social distancing restrictions.

We now come back to you to ask a few more questions and see how things have changed. It should not take more than 5 minutes of your time. As you might know, the "NHS Test and Trace" service starts today Thursday 28 May (see in the picture the notice of yesterday from the Department of Health and Social Care).

Many thanks for your participation, and we will be back with a longer follow-up in a couple of weeks.



**Government launches NHS Test and Trace service**

New guidance means those who have been in close contact with someone who tests positive must isolate for 14 days, even if they have no symptoms.

Published 27 May 2020
From: **Department of Health and Social Care**

- NHS Test and Trace service to form a central part of the government's coronavirus recovery strategy
- Anyone with symptoms will be tested and their close contacts will be traced
- New guidance means those who have been in close contact with someone who tests positive must isolate for 14 days, even if they have no symptoms, to avoid unknowingly spreading the virus

The new NHS Test and Trace service will launch tomorrow (Thursday 28 May) across England, the government announced.

# Compliance Probabilities: Baseline *vs* Follow-Up
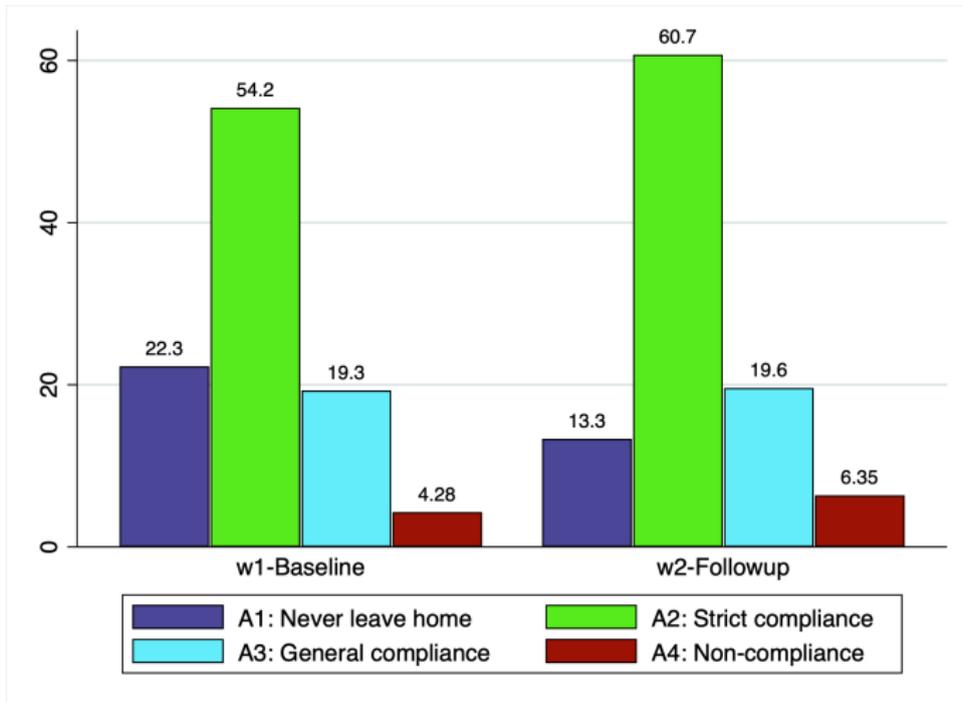
# Cummings and Self-Isolating Probabilities

Reasons given for different reported percent chances to self-isolate.

<50% chance to self-isolate if told so by NHS Test and Trace

51
35
15
6
4

Change in Guidance — Cummings Story — Low Trust — Had it/Depends — Work Concerns

>50% chance to self-isolate if told so by NHS Test and Trace

77
19
7
5

100% chance to self-isolate if told so by NHS Test and Trace

76
4
16
8

Change in Guidance — Cummings Story — Own/Others Safety — Right/Sensible Behaviour
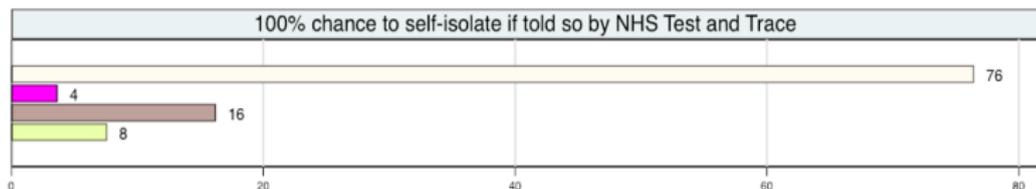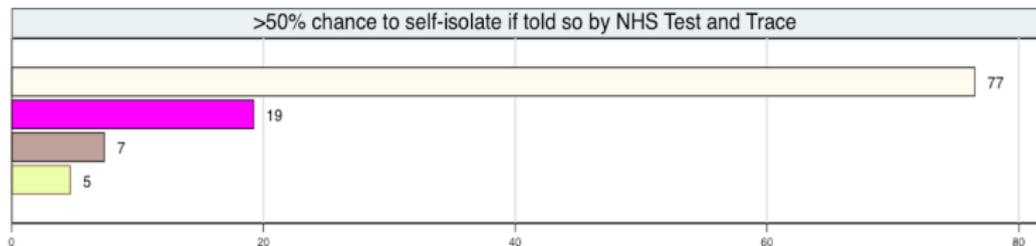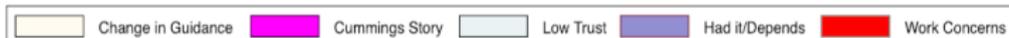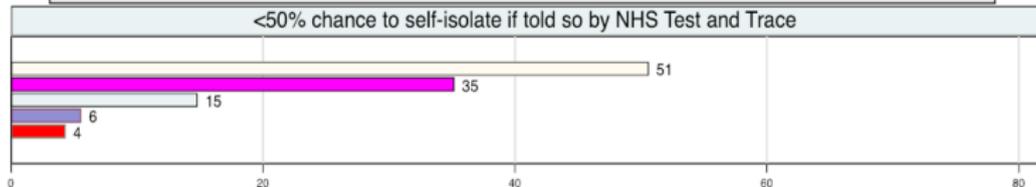
# PC Self-Isolation if Told So by NHS Test & Trace  Back

New TT question: *"Between 0 and 100 percent what are the chances that you will self-isolate (even with no symptoms) if the NHS Test and Trace contact tracers tell you that you have been in contact with someone who has the virus in the previous 14 days?"*
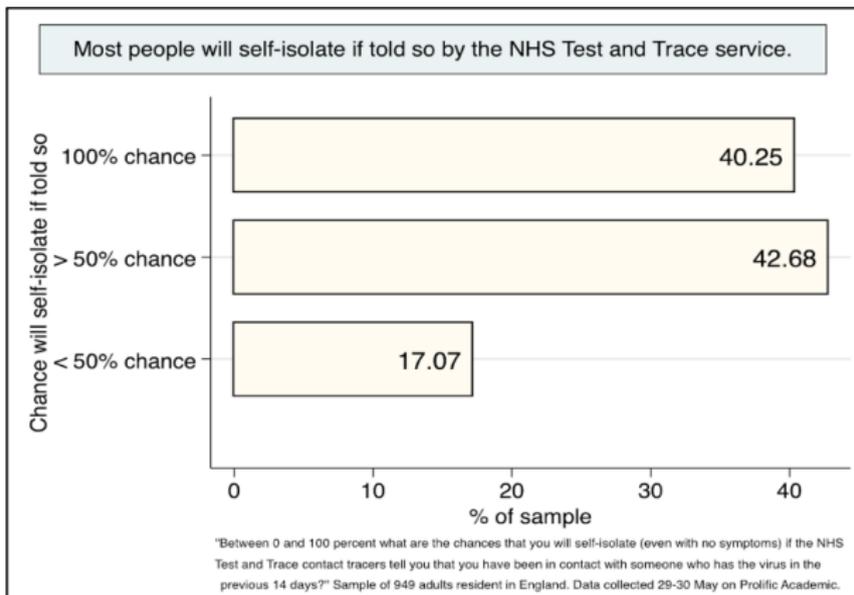
# Treatment: Cummings Screen

You might have heard in the news in recent days the story about the UK Prime Minister Boris Johnson's most senior adviser, Dominic Cummings.

Below we report some information on this story, taken from the BBC News website https://www.bbc.co.uk/news/uk-politics-52784290, which contains more details.

**23 March**: The "Stay at Home" guidance is issued by the Prime Minister.

**27 March**: Mr Cummings travels 260 miles from London to his parents' home in Durham with his wife and four-year-old son, arriving "at roughly midnight". His wife had suddenly felt badly ill earlier in the day. "I was worried that if my wife and I were both seriously ill, possibly hospitalised, there was nobody in London we could reasonably ask to look after our child and expose themselves to Covid."

**12 April**: Mr Cummings drives from Durham to Barnard Castle, about 25 miles from his parents' home in Durham, with his wife and child. He explained this episode as needing to test his driving was fine before making the long drive back to London. He said he'd been having problems with his vision.

**25 May**: Mr Cummings gives a statement (https://www.independent.co.uk/news/uk/politics/dominic-cummings-statement-speech-transcript-durham-full-text-read-lockdown-a9531856.html) and answers journalists' questions in Downing Street rose garden. "I believe that in all the circumstances I behaved reasonably and legally, balancing the safety of my family and the extreme situation in Number 10." He said "I don't regret what I did" and added that "the rules make clear that if you are dealing with small children that can be exceptional circumstances and the situation I was in was exceptional circumstances".

# Treatment Effects on Compliance Probs: FU Sample Back

| | PC Never Leave Home | | PC Strict Compliance | | PC General Compliance | | PC Non-Compliance | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Tori | Labour | Tori | Labour | Tori | Labour | Tori | Labour |
| Treated | 2.646 | -7.664*** | -0.788 | -0.0670 | -2.778 | 7.403*** | 0.920 | 0.328 |
| | (2.693) | (2.516) | (3.906) | (3.394) | (2.962) | (2.708) | (1.948) | (1.551) |
| Ctrl Mean | 11.40*** | 18.65*** | 62.48*** | 57.79*** | 19.90*** | 17.28*** | 6.226*** | 6.276*** |
| | (1.841) | (1.751) | (2.670) | (2.362) | (2.025) | (1.885) | (1.332) | (1.080) |
| N | 308 | 386 | 308 | 386 | 308 | 386 | 308 | 386 |

Note: Results in each column come from separate regressions on subsamples defined by the political affiliation.
***: $p<0.01$; **: $p<0.05$; *: $p<0.1$.

# Treatment Effects on Compliance Probs: Panel Sample <span>Back</span>

| | PC Never Leave Home $P(A1_{t1})$ | PC Strict Compliance $P(A2_{t1})$ | PC General Compliance $P(A3_{t1})$ | PC Non-Compliance $P(A4_{t1})$ |
|---|---|---|---|---|
| Treated | 0.626 (1.736) | -2.954 (4.044) | -1.164 (2.037) | -0.325 (1.127) |
| $P(A1_{t0})$ | 0.475*** (0.0318) | | | |
| Treated $\times$ $P(A1_{t0})$ | -0.0675 (0.0465) | | | |
| $P(A2_{t0})$ | | 0.439*** (0.0444) | | |
| Treated $\times$ $P(A2_{t0})$ | | 0.0188 (0.0640) | | |
| $P(A3_{t0})$ | | | 0.357*** (0.0462) | |
| Treated $\times$ $P(A3_{t0})$ | | | 0.189*** (0.0670) | |
| $P(A4_{t0})$ | | | | 0.191*** (0.0642) |
| Treated $\times$ $P(A4_{t0})$ | | | | 0.165 (0.101) |
| N | 905 | 905 | 905 | 905 |

Note: Results in each column come from separate regressions.
$T_1$ = follow-up, $T_0$ = baseline. ***: $p<0.01$; **: $p<0.05$; *: $p<0.1$.