The impact of law on moral and social norms: evidence from facemask fines in the UK

Chiara Berneri[1] · Shaun Larcom[2] · Congmin Peng[3] · Po-Wen She[2,3]

Abstract

We measure the extent that a prevailing law can affect moral and social norms. We use variations in facemask fines in the UK during the COVID-19 pandemic as a case study, as it presents us with many features of a natural experiment. Our analysis provides two important findings. First, we find that the legal status of a behaviour, that is whether the behaviour is illegal or not, is important in influencing stated compliance and moral and social norms. In contrast we find no evidence that a variation in penalties has any effect on stated compliance or moral or social norms. We consider these results are important for law makers and society, as both moral and social norms are known to be important drivers of social change, and our results show that legality influences both—thus highlighting an endogenous relationship between the law—and moral and social norms.

1 Introduction

Presumably when the then Prime Minister of the UK, Boris Johnson, doubled the fine to increase compliance in England he had deterrence theory in mind.[1] At its most basic, Becker's (1968) 'rational choice' framework of legal compliance states

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[1] PM Commons Statement on Coronavirus, 22 September 2020, https://www.gov.uk/government/speeches/pm-commons-statement-on-coronavirus-22-september-2020.

✉ Shaun Larcom
  stl25@cam.ac.uk

[1] The Open University, Milton Keynes, UK

[2] University of Cambridge, 19 Silver St, Cambridge CB3 9EL, UK

[3] National Sun Yat-Sen University, Kaohsiung, Taiwan

that the decision to commit a crime is function of the expected punishment ($p.f$), where p represents the probability of facing punishment and f is the magnitude of the punishment.[2] In addition to the expected punishment from the state, we know that legal compliance is driven by many other factors including morality, norms and self-preservation. Indeed, for those bound by strong moral norms, the penalties imposed by the state may have little or no influence on decision making (Mulder, 2018; Kroneberg 2010). However, the prevailing law may influence moral and social norms themselves (Aksoy et al., 2020; Larcom et al., 2019; Tankard & Paluck, 2017).

We aim to measure whether the increase in a fine around facemask use (and its later revocation) influenced moral and social norms. If it did, it has important implications for law makers and society. If moral norms are influenced by the magnitude or existence of a fine, the stakes from legal change would be considerably higher than simply changing behaviour—as it may also change hearts and minds. This is something not lost on reformers who see the law not only as an important tool for reshaping social conditions, but also 'the minds of people embedded in our society' (Lewis, 2023, 213). We also know that changing people's perceptions of social norms can change their behaviour and engineer social change (see Miller & Prentice, 2016; Tankard & Paluck, 2017; Prentice & Paluck, 2020). Therefore, if the magnitude of a fine or its revocation does reshape our minds, both in terms of our moral and social norms, it would suggest an endogenous, and potentially circular relationship between law and moral and social norms. This in turn raises questions over the validity of 'opinion poll' arguments for legal reform.

Understanding the motivations for legal compliance and the role the law can play in shaping moral and social norms has been of great interest to social scientists, across disciplines, including law, sociology, economics, social psychology and philosophy. It also directly relates to a number of socio-legal concepts that include legitimacy, expression, internalisation, legal cynicism and social norms. We aim to add to this literature by studying motivations for wearing facemasks in the UK during the COVID-19 pandemic. Our case study provides us with many of the elements of a natural experiment due to the variation in facemask laws in the UK over both place and time.

The remainder of this manuscript is as follows. We first provide review of the relevant literature and an overview of our empirical strategy. We then provide an account of the evolution of facemask law and policy in the UK, highlighting the key changes in the law and the seemingly exogenous nature of the legislative changes within different jurisdictions of the UK. We then describe our data and provide a discussion of the key descriptive statistics, including the key motivations for wearing

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[2] See Chalfin and McCrary (2017) for an empirical review. Despite empirical support, there remain many exceptions, nuances and unknowns. For instance, the marginal impact of increasing already very high penalties seems low or non-existent (see Parker, 2021), and that legal compliance is more sensitive to the probability of punishment than to the magnitude of the punishment (Chalfin & McCrary, 2017). One notable feature of the vast empirical literature on deterrence is that it is highly concentrated on serious crimes involving custodial penalties; however, despite far fewer empirical studies, this pattern showing the importance of enforcement effort also seems to hold for administrative penalties involving fines (see Elvik & Christensen, 2007; Luca, 2015).

facemasks. Following our methods section, we present our key results. This is followed by a discussion of our results and a conclusion.

2 Literature review

Scott (2000, 1603–4) has developed a useful typology for considering the motivations of legal compliance that we used to guide our analysis. The first mechanism is what he labels the 'first order' or 'direct' effect. This consists of the punishment by the state itself, in that those who choose not to comply with the law are faced with the probability of diminished freedom, wealth or consumption opportunities. The next type is the 'second order' effect, which is generated by empowering non-state actors (such as fellow shoppers or employees in this case) to use informal sanctions (such as shaming or admonishment) as an enforcement technique. The third type relates to self-sanctioning (or 'third order') effects, where 'citizens internalize the legal rule and are deterred by the prospect of guilt' (Scott, 2000, 1604). Scott (2000, 1604) states:

> These latter effects require that legal rules be mediated through social phenomena-social norms and human emotions-that are highly complex and only imperfectly understood. In the case of a shaming sanction, the law must rely on existing normative structures to influence in predictable ways the "expression" or social meaning of the disfavored (or favored) action. In the case of self-sanctions, the law must rely on the even more complex phenomenon of internalization of normative behavior.

Some of this complexity arises as we can expect that the first order effects, that is the legality of an act and the magnitude of the sanctions attached, to influence second and third order effects identified by Scott (2000). Indeed, Etzioni (2000), Sunstein (1996), Cooter (1998), McAdams (1997) have all emphasised the expressive function of law.[3] In this sense, lawmakers can make a statement about appropriate behaviour that can potentially lead to changes in beliefs, preferences, social norms (and perceptions of them). While noting the ambiguity of the concept, Feldman (2009) has suggested that there are multiple potential channels. One relates to how the law can facilitate coordination among individuals by providing them with a focal outcome. Another relates to how the law can provide a statement about what is moral. This mechanism highlights the ability of the law to change the way a given behaviour is regarded from a moral standpoint. Relatedly, Kaplow and Shavell (2007) propose that when acting, individuals can experience guilt (when not complying with the law) or virtue (when acting in compliance with the law) that affects their utility and motivates behaviour in the direction of the new law.[4] Another relates

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[3] In a similar way, Hart's (1997) concept of the internal point of view suggests that citizens can take the decision to accept the law as a guide for conduct and in determining what is appropriate behaviour.

[4] They also allow for law makers to invest in inculcation activities that can enhance feelings of guilt and virtue. The literature related to the internalisation of law and its expressive function is large, and spans disciplines, including the large literature on how economic incentives can crowd-in and crowd-out pro-social behaviour (see Frey & Jegen, 2001; Benabou & Tirole, 2006; Bowles & Polania-Reyes, 2012).

to social sanctions being imposed on violators. Feldman's (2009) empirical analysis of trade secrets law in the Silicon Valley found evidence for the morality and coordination models but found little evidence of social sanctioning being an important channel. In addition to these mechanisms, the legality of a given behaviour may provide information that enables those subjected to it to moderate their behaviour. In this sense, the legal status of an activity may motivate compliance through signalling information on the riskiness of an activity (Dharmapala & McAdams, 2003 and Feldman, 2011).

While the legality of a behaviour may influence moral and social norms, we know that some laws can conflict with moral intuition and even create backlashes (Wilkinson-Ryan & Baron, 2008).[5] There is also the direction of causality to consider. Do laws shape moral rules or do moral rules shape law? As noted by Lewis (2023) there is often a general presumption that in many societies that laws eventually fall into line with the standards and will of the people. But it seems likely that both law and moral rules can influence the other, in a relationship that is not easily unentangled (Hart, 1957).

In addition to the theoretical contributions, there have been a number of empirical examinations on the impact of actual laws on moral and social norms.[6] More recently, Aksoy et al. (2020) found that the introduction of the same sex marriage laws in Europe led to an increase (of 3.6% points) in the likelihood that a respondent agreed that gay men and lesbians should be free to live their own life as they wish, over a 10 year period.[7] Tankard and Paluck (2017) measured the effect of the US Supreme Court's ruling *Obergefell v Hodges* on same sex-marriage over a five-month period. They found that while moral attitudes toward same-sex marriage did not change, perceptions of social norms did. They note that perceived social norms matter 'because they represent shifts in individuals' understanding of their society—where it stands and where it is going' (Tankard and Paluck (2017, 1342). Jonsson (2023), and Babaoglu and Wulf (2016) both measured the behavioural impact of decriminalisation on a given behaviour (prostitution and check bouncing respectively), drawing on the concept of stigma. Both studies found that decriminalisation was associated with an increase in the respective behaviours, providing suggestive evidence that decriminalisation led to a fall in the stigma associated with the activities. In relation to the pandemic, Casoria et al (2021) found, using online

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[5] In some instances criminalising behaviour or increasing penalties may create backlashes (see Akerlof & Dickens, 1982; Carbonara et al., 2012; Hiller & Recoules, 2013).

[6] The empirical literature dates back to at least Walker and Argyle (1964) whose work suggested that the law can change views about what society deems morally wrong. There is also a large literature on how 'institutions' shape political outlooks and morality (see Dari-Mattiacci & Fabbri, 2023). Also see self-determination theory (including numerous empirical studies) within the within social psychology literature (see Dec & Ryan, 2012). Crowding theory within the economics literature is also relevant (Bowles & Polania-Reyes, 2012; Larcom et al., 2019).

[7] The 3.6 percentage point increase accounts for approximately one third of the ten-percentage point increase over their sample period. Larcom et al (2019) using a difference-in-differences framework, found that a legal change that included 5-pence charge on the use of plastic bags led to a 3.7% point increase in intrinsic motivation for minimising plastic bag use. This study had a sample size of 2704 over a seven-week period.

experimental empirical framework, that changes in social distancing laws in France led to changes in habits, and the perceived appropriateness of socialising and monetary penalties for rule violators.

There has also been empirical analysis on the relationship between the magnitude (and type) of the sanction and moral and social norms—with mixed results. As noted by Mulder (2018, 336), '[a]s serious crimes are usually sanctioned more severely than small crimes, the size of the sanction attached to a rule may actually communicate how serious it is to break the rule, and thus, how immoral rule breaking behavior is.'[8] Indeed, Mulder et al (2009) found that (moderately) large fines made people morally disapprove of the non-cooperative behaviour more than a small one (particularly being the case when trust in the authority imposing the sanctions is high). However, Feldman and Perez (2009) found that criminal sanctions (fines and imprisonment) did not have substantially stronger moral and emotional reactions compared to the other instruments they studied. Interestingly, they also found that despite having different magnitudes, fines and imprisonment did not generate significantly different reactions from their participants—and called for further research.

We aim to build on the above literature by measuring the impact of an actual increase in a fine and its revocation, on moral and social norms. To the best of our knowledge, we are the first to do so. We consider this to be an important contribution as the impact of removing a fine may be very different from instating one (or increasing its magnitude). We also aim to add to the literature on the economic analysis of facemask and COVID-19 laws more generally, building on the work of many others, including Tobol et al (2020), Marciano and Ramello (2022) and Sarel (2022). We consider our contribution to be particularly important, as during the pandemic, social norms were advocated as an important mechanism to support the state's pandemic response (Bavel et al., 2020).

3 Empirical framework

In this section we provide an overview of our empirical framework, which centres around collecting data on nine statements concerning compliance with wearing face coverings (the generic term for facemasks in the UK) and the *motivations* for wearing them.

The nine statements were specifically designed to measure compliance and Scott's (2000) typology for the motivations of compliance with the law. In doing so, we acknowledge that it may not always be possible to fully disentangle one motivation from another, due to the potential for overlap. Also, Scott's (2000) types themselves may have different interpretations. For instance, Scott's (2000) third order

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[8] Mulder (2018) highlights the ability for legal sanctions to convey moral norms. She emphasises three conditions from the psychology literature that influences the ability of the sanction to conveying/evoking moral norms. The first is that the sanction should be conveyed as a punishment (and not as compensation). The second is that punishments communicate an obligatory rule while rewards communicate a voluntary rule. The third is that severe sanctions convey a moral rule more strongly than mild ones (as long as they are not too severe).

effects could be interpreted as either the full internalisation of a moral attitude or self-sanctioning based on a largely external moral norm. In addition to aiming to measure each element of Scott's typology, we also included statements aimed at measuring other motivations that were salient at the time of the pandemic.

The statements in full and their connections to the literature (including Scott's, 2000 typology) are provided in Table 1 below. The first of the nine statements (*use*) was aimed to capture the degree of stated compliance with the law that requires individuals to wear facemasks in indoor public spaces (with the example of shops being chosen). The remaining questions aimed to capture the stated motivations for wearing facemasks in shops. The first two motivations are to avoid being fined (*fine*) and to comply with the law (*law*). These aim to measure what Scott (2000) labels the first order or 'direct' effects. The *fine* consists of the punishment itself, in that those who choose not to comply with the law are faced with the probability of direct penalty. The next two motivations are to avoid social sanctions or anxiety (*worry*) and to avoid being told-off by others (*told-off*). These aim to measure what Scott (2000) deemed to be 'second order' effects, which are generated by empowering non-state actors (such as fellow shoppers or employees) to use informal sanctions as an enforcement technique. Both of these statements should measure perceived social norms associated with non-state enforcement. The next motivation is to avoid feeling guilty (*guilt*). This aims to measure what Scott (2000, 1604) deemed to be the 'third order' effects of law, which relates to self-sanctioning where 'citizens internalize the legal rule and are deterred by the prospect of guilt'. Given that the guilt from self-sanctioning could be driven from internalisation or something more extrinsic (ie norms), we use guilt as a measure for 'moral norms'. The next two motivations are to reduce the spread of the disease (*spread*) and to reduce the probability of catching the disease (*catch*). These two were commonly stated reasons for wearing masks in public discourse during the pandemic and may capture elements of altruism and self-preservation. They may also capture elements of the expressive function of the law literature not explicitly covered by Scott (2000), in that the legality of masks and the magnitude of the fine may provide information on the riskiness of an activity and provide a focal point for co-ordination (Dharmapala & McAdams, 2003; Feldman, 2009, 2011). Wearing a mask to reduce the spread of the virus may even capture internalisation of the law. Finally, the last statement sought views on whether people planned to wearing facemasks beyond the pandemic (*beyond*) in an attempt to measure perceptions on a new behavioural norm being formed.

Respondents were asked to assign a value to each statement along a 100-point scale, where a value of 0 represented "I strongly disagree"; 50—"I neither agree nor disagree"; and 100—"I strongly agree". The order of the statements was randomised for individual respondents. In addition to the nine statements, we also collect data on demographic variables (see Table 9 for all variables and definitions).

In presenting these statements, we acknowledge that self-reported measures of behaviour can carry a bias, especially if the behaviours (or motivations) are deemed to be socially desirable (Browning et al., 2003; Feunekes et al., 1999; Schwarz & Oyserman, 2001). While acknowledging this possibility, a web-based survey provides privacy and obviates the need for human interaction, which should limit

Table 1 Survey Statements and Links to the Literature

Abbreviation	Statements	Measurement of
Use	When I go to a shop I wear a face covering	Compliance
Fine	I wear a face covering in shops because I do not want to be fined	Scott's first order effect (direct punishment by the State)
Law	I wear a face covering in shops because I do not want to break the law	Scott's first order effect (direct punishment by the state)*
Others	If I did not wear a face covering in shops I would worry what other people think of me	Scott's second order effect (social norms)
Told-off	If I did not wear a face covering in shops I would worry that I would be told off	Scott's second order effect (social norms)
Guilt	If I did not wear a face covering in shops I would feel guilty	Scott's Third order effect (moral norms)
Spread	I wear a face covering in shops because I want to reduce the spread of COVID-19	Altruism. Provision of information to co-ordinate behaviour and riskiness of activity. Potentially Scott's third order effect
Catch	I wear a face covering in shops because I do not want to catch COVID-19	Self-preservation. Potentially providing information on riskiness of activity
Beyond	I plan on wearing face coverings in shops beyond the current COVID-19 pandemic	Evolution of norms

*Potentially also picking up Hart's conception of the internal point of view

the bias.[9] Another potential weakness relates to the potential for self-image bias (Lewicki, 1983), where people may not be fully honest with themselves on how or why they comply with the law. However, as with the case of social desirability bias, the magnitude of this bias would need to change over the survey periods to affect this study. While both biases are not easily observable, if they do vary with the changes in the law in our study, while complicating the interpretation of our results, they would also point to the law changing motivations for compliance.

4 Facemask laws in the UK

As can be seen in Table 2 below, fines were introduced in each jurisdiction between July–September 2020. Scotland was the first jurisdiction to impose a fine on 10 July 2021, shortly followed by England. In Scotland, the headline fine was set at £60, where it remained throughout the sample period (as is the case with Wales who first introduced its fine on 14 September 2020). In England, the headline fine was initially set at £100 for non-compliance. However, on 24 September 2020, a period in-between the first and second waves, but faced with rising cases across the UK, the government doubled the fine, from £100 to £200. Despite facing broadly similar public health issues, Scotland and Wales did not change the magnitude of the fine throughout the pandemic. In the case of Scotland, this seems to be driven by equity considerations. At the time, the then First Minister of Scotland, Nicola Sturgeon, is quoted as saying: 'Supporting people to do the right thing is much more effective than threatening harsh punishment if they cannot.' Northern Ireland initially set its fine at £60 on 10 August 2020, however also increased its fine to £200 on 12 November 2020.

On 19 July 2021, following a successful largescale vaccination programme *across the whole* of the UK that saw approximately 70% of the population having received at least one vaccine dose, the fine was revoked in England (along with other COVID-19 legal restrictions).[10] Guidance in England included recommending, but not obliging, the use of a face covering in crowded and enclosed spaces.[11] Despite the revocation in England, all other jurisdictions maintained their fines over

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[9] Web-based surveys are also not without their own problems, in particular with respect to non-uniform access to the internet and that respondents self-select into the panel (see Bethlehem, 2010). However, the UK has one of the highest internet penetration rates in the world (at over 90 percent) and the survey panel is very large (with around 300,000 people) and is designed to be able to generate nationally representative samples.

[10] The Health Protection (Coronavirus, Wearing of Face Coverings in a Relevant Place) (England) Regulations 2020 were revoked on 18 July 2021 at 11.55 by The Health Protection (Coronavirus, Restrictions) (Steps etc.) (Revocation and Amendment) Regulations 2021, Regulation 2, available at The Health Protection (Coronavirus, Restrictions) (Steps etc.) (England) (Revocation and Amendment) Regulations 2021 (legislation.gov.uk).

[11] PM statement at Coronavirus press conference: 14 June 2021, press release published on 14 June 2021, available at PM statement at coronavirus press conference: 14 June 2021—GOV.UK (www.gov.uk).

Table 2 Headline Penalties for Non-Compliance with Facemask law in the UK

Country	Original penalty	£200 penalty introduced	Penalty revoked
England	£100	Yes	Yes
Date introduced	24 July 2020	24 September 2020	19 July 2021
Scotland	£60	No	No
Date introduced	10 July 2020	–	–
Wales	£60	No	No
Date introduced	14 September 2020	–	–
Northern Ireland	£60	Yes	No
Date introduced	10 August 2020	12 November 2020	–

our sample period (despite facing similar COVID-19 rates and relaxing many other COVID-19 measures on the same date).[12]

While there was variation in COVID-19 rates (and death rates attributed to COVID-19) across jurisdictions, each jurisdiction was at a strikingly similar point in the UK wide COVID-19 cycle (see Figs. 6 and 7). It is also noteworthy that the England had higher rates in 2 of the other 3 jurisdictions. This suggests that the changes in the facemask fine regimes were largely separate from the underlying public health situation and seemed to be driven more by individual perceptions and preferences of decision makers in each jurisdiction. In particular, when the fine for failing to wear a facemask was repealed in England on 19 July 2021 (along with other COVID-19 restrictions), all the other UK jurisdictions also significantly reduced their COVID-19 restrictions on the same day, however not the requirement to wear a facemask.[13] Furthermore, following the post-Pandemic leak of 100,000 WhatsApp messages of the then English health minister Matthew Hancock from during the pandemic, it has been concluded that the 'messages reveal what at times seems to be casual decision making or policy made on the basis of gut feeling' (Wise, 2023, 522).[14]

The changes in the fine regime allow us to measure the impact of two distinct changes. The first is the increase in the magnitude of a pre-existing fine. The second is the abolition of a fine altogether. When the fine was abolished, the rules governing facemask behaviour have been removed and there is no obligation to wear a facemask. Whereas for the increase in penalty, the rules remained in place. In this sense, the fine increase can be seen as a move along the intensive margin (a change in the magnitude of penalty), while the abolition can be seen as a move at the extensive margin (a binary change in legality of the behaviour).

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[12] See BBC 2021, https://www.bbc.co.uk/newsround/57878555.

[13] See BBC 2021, https://www.bbc.co.uk/newsround/57878555

[14] It should be noted that while the different jurisdictions in the UK implemented and revoked facemask laws at different times, there was a degree of support across major parties and jurisdictions, that seemed to make the laws less politicised than in the United States (Myers & Downey, 2023).

5 Data and sampling

We use three waves of repeated cross-sectional data via an online survey implemented by Dynata, drawn from their panel of approximately 300,000 individuals. Wave 1 was collected from 20 to 30 September 2020, Wave 2 was collected from 1 to 13 July 2021 and Wave 3 was collected from 24 August to 2 September 2021. To obtain a nationally representative sample, a quota-sampling strategy was applied for each survey wave; with quotas set for age, gender, education, income and regional distribution (at the NUTS1 level)[15] of the population to match UK characteristics. There are a total of 6856 responses (see Table 6 for number of observations by date).

6 Descriptive statistics

6.1 Use and motivation over sample period

Figure 1 provides the means for each of the nine statements. This provides insight into the level of stated compliance, and motivations for wearing facemasks over the whole sample period (from September 2020 to September 2021). As can be seen, there was a high degree of stated facemask use over this period—with mean response for *use* being approximately 81 points. This result is consistent with casual observation, that suggests that wearing masks in shops was high, but not universal.[16]

In terms of degree of motivation, the two highest were wishing to reduce the *spread* of the virus (with a mean of 78 points) and not wishing to *catch* the virus (with a mean of 73). The next was avoiding feelings of *guilt* (with a mean of 68 points). This was followed by complying with the law (with a mean of 66 points) and avoiding a *fine* (with a mean of 58 points). Concerns over what *others* might think and being *told-off*, were above 50 (which indicates neutrality with the statement), but relatively less important at approximately 55 points each. Intention to wear masks beyond the pandemic was at 60 points.

In the following sub-sections we present the descriptive statistics over time. For the fine increase data we include both England and Northern Ireland in the treatment group, as both countries experienced a fine increase in 2020. For the fine removal data we only include England in the treatment group. As can be seen below, there is generally a fall in stated use and motivation over time, in both the treatment and control groups. However, while the reductions largely move together in both the

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[15] The NUTS1 level comprises of 12 countries/regions. They are Scotland, Wales, Northern Ireland. In England they consist of North East, North West, Yorkshire and the Humber, East Midlands, West Midlands, East of England, London, South East and South West.

[16] It must also be noted that a number of people are exempt from wearing masks in public indoor spaces due to medical conditions and disabilities. See in particular Face coverings: when to wear one, exemptions, and how to make your own, available at https://www.gov.uk/government/publications/face-coverings-when-to-wear-one-and-how-to-make-your-own/face-coverings-when-to-wear-one-and-how-to-make-your-own.
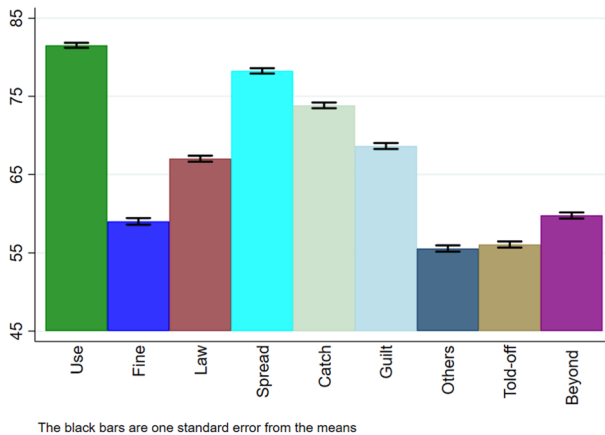
The black bars are one standard error from the means

Fig. 1 Mean values for use and motivations during sample period

treatment and control groups before and after the fine increases, there are marked reductions in the treatment group after the fine is removed for use and some motivations, that are not matched by the treatment group. These downward trends in both the treatment and control groups underscore the need for a difference-in-differences type estimation method to estimate the impact of the fine increases and removal.

6.2 Use and motivation: pre-post fine increases

Figure 2 below provides the mean values of the respondents for the treatment group (England and Wales) and the control group (Scotland and Wales) both before and after the fine increase in England. The date of the fine increase in England was on 24 September 2020 and we include all data up to its revocation on 19 July 2021.[17]

Stated use fell slightly in the treatment group during the time period when the fine was increased, from approximately 86 to 83 points. However, there was a similar fall in the control group, where stated use fell from 90 to 88 points. A similar pattern can be found in terms of the motivations for use, where motivations were generally reported to be higher in the control group, but fell in the post-fine increase period in both places. Treatment group motivations generally fell by approximately 2 to 4 points. In the control group, most motivations also fell by 2 to 4 points, with the two exceptions being *fine* and *law* that fell by 8 and 7 points respectively, and saw these two motivations become almost equivalent to the treatment group in the post fine increase period.[18]

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[17] In doing so, we note that the Northern Ireland fine increase took place at a later date, on 12 November. This has the potential to bias the graphs, however, it must be noted that Northern Ireland data makes up approximately 3 percent of the total. The fine increase in Northern Ireland can be accommodated in a straightforward manner econometrically (see estimation section).

[18] This final result is interesting, given that the fine was not changed in the control group, however it must be noted that once controlling for demographic variables and time fixed effects, there is no significant difference pre-post fine increases relative to the treatment group.
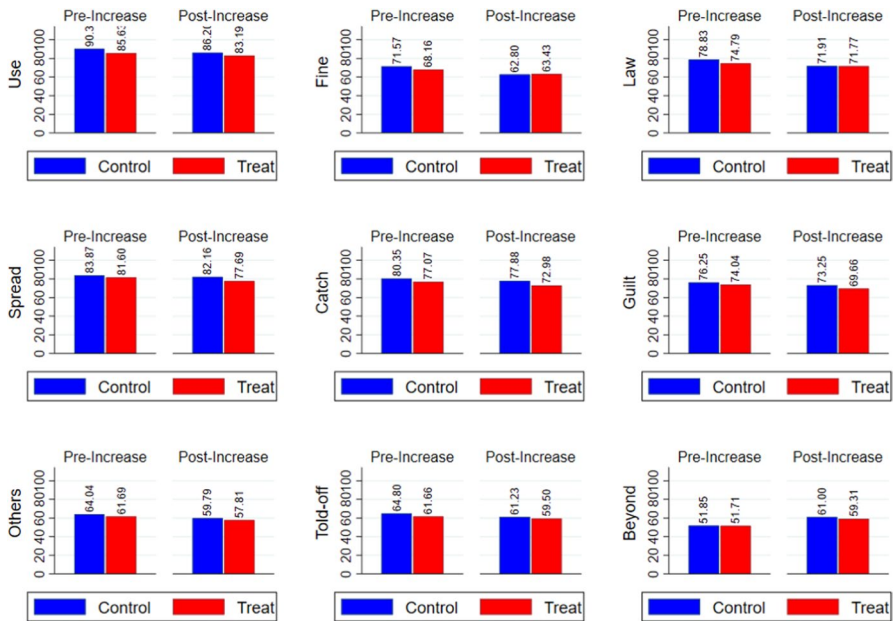
Fig. 2 Mean values pre and post fine increase in England

6.3 Use and motivation: pre-post revocation of fine in England

Figure 3 below provides the mean values of the respondents for the treatment group (in this case England as that is the only country that revoked its fine) and the control group (Scotland, Northern Ireland and Wales) both before and after the revocation of fine in England on 19 July 2021.[19]

As can be seen, stated *use* in England fell by approximately 8 points in the sample period after the revocation of the fine, from 83 to 75 points. While stated use also fell in the rest of the UK, it only fell by approximately 2 points, from 86 to 84 points.

As would be expected, the fall in motivation around not wishing to be *fined* was particularly stark in England. It fell by 18 points, from 64 to 46 points. Importantly, the mean fell below 50 which implies net disagreement with the statement. While the motivation for wishing to avoid a fine also fell in the rest of the UK, it only fell by 4 points, from 62 to 58 points. A similar large fall for England can be seen for the motivation of not wishing to break the *law*, which fell 19 points, from 72 to 53 points. Again, while there was a fall in the rest of the UK, it was much smaller at 5 points, moving from 72 to 67 points.

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[19] The post period is approximately 6.5 weeks (from 19 July 2021 to 2 September 2021). Given the pervious increase in fine for England, for consistency, we only include data in the pre-period from 24 September 2020 onwards (the date of the fine increase in England).
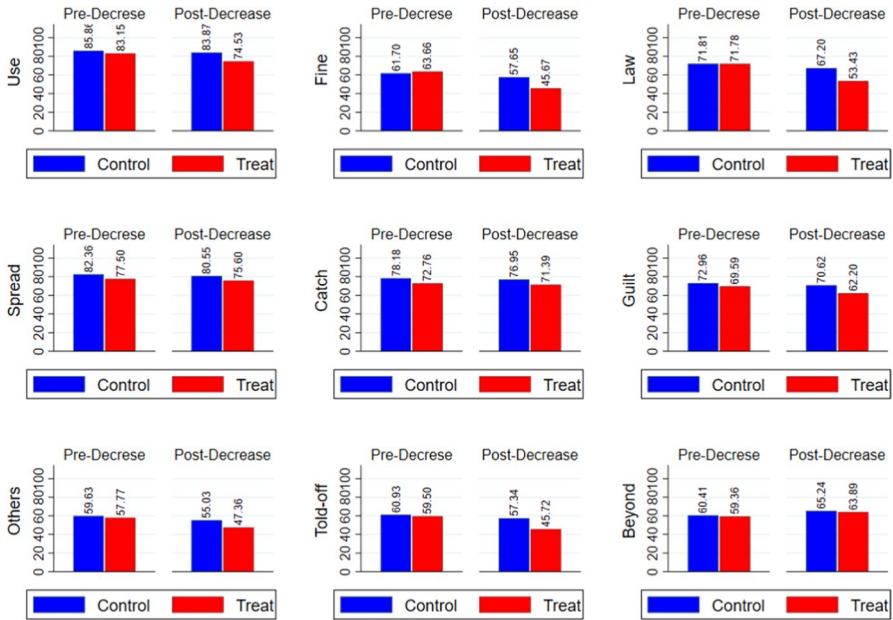
Fig. 3 Mean values pre-and-post removal of fine in England

While there were large reductions in some motivations in England following the fine being revoked, not wishing to *spread* or *catch* the virus were remarkably stable and broadly in-line with the control group. In particular, they both fell by 2 points in England after the fine was removed (moving from 78 to 77 and 73 to 71 respectively), compared to 1 point reductions in the rest of the UK.

In terms of motivations that relate to Scott's (2000) second and third order effects, we see large reductions in England following the removal of the fine. Wearing a facemask to avoid feelings of *guilt* fell by 8 points in England, from 70 to 62 points. This compares to a much smaller 2 point fall in the rest of the UK. Concern over what *others* might think, fell by 11 points in England, from 58 to 47 points, compared to a 5 point fall in the rest of the UK. The motivation for not wishing to be *told-off* fell by 14 points in England, from 60 to 46 points, compared to a 4 point fall in the rest of the UK.

Finally, the mean value for the intention to wear a mask *beyond* the current COVID-19 pandemic increased in in both jurisdictions by 5 points following the removal of the fine in England. As can be seen from Fig. 2 above, in the early part of our sample period this question drew a largely neutral response in both jurisdictions, but consistently increased over time, to be at 64 points in England and 65 points in the rest of the UK. This suggests that a norm of mask wearing developed, at least among a sub-group of people (see the econometric results below for their demographic attributes) and seems largely independent of government action concerning the magnitude of a fine.

6.4 Use and motivation over time: Fine Increases

In Fig. 4 below, we provide graphs for stated use and motivation over time that allows us to examine the pre-and-post trends. As for above, for the fine increase, we include all data up to the revocation in England on 19 July 2021. As our full dataset was collected in three distinct waves (of approximately two weeks each) over a period of approximately one year, and that the number of responses during any given day are variable, we have aggregated the data 10 groups – with the aim of better displaying the trends over time, however it must be noted the data are not suitable for formal event study analysis.[20] We also provide an indicator for the fine increase in England on 24 September 2020 (short-dash vertical line) and Northern Ireland on 12 November 2020 (long dash-dot).

As can be seen below, the mean value for *use* for the treatment group (England and Northern Ireland) and control group (Scotland and Wales) largely moves together before and after both fine increases – with no indication marked change in the treatment group. A similar pattern can be seen for the motivations, that generally move together, with no evidence of divergence after the fine increases.[21]
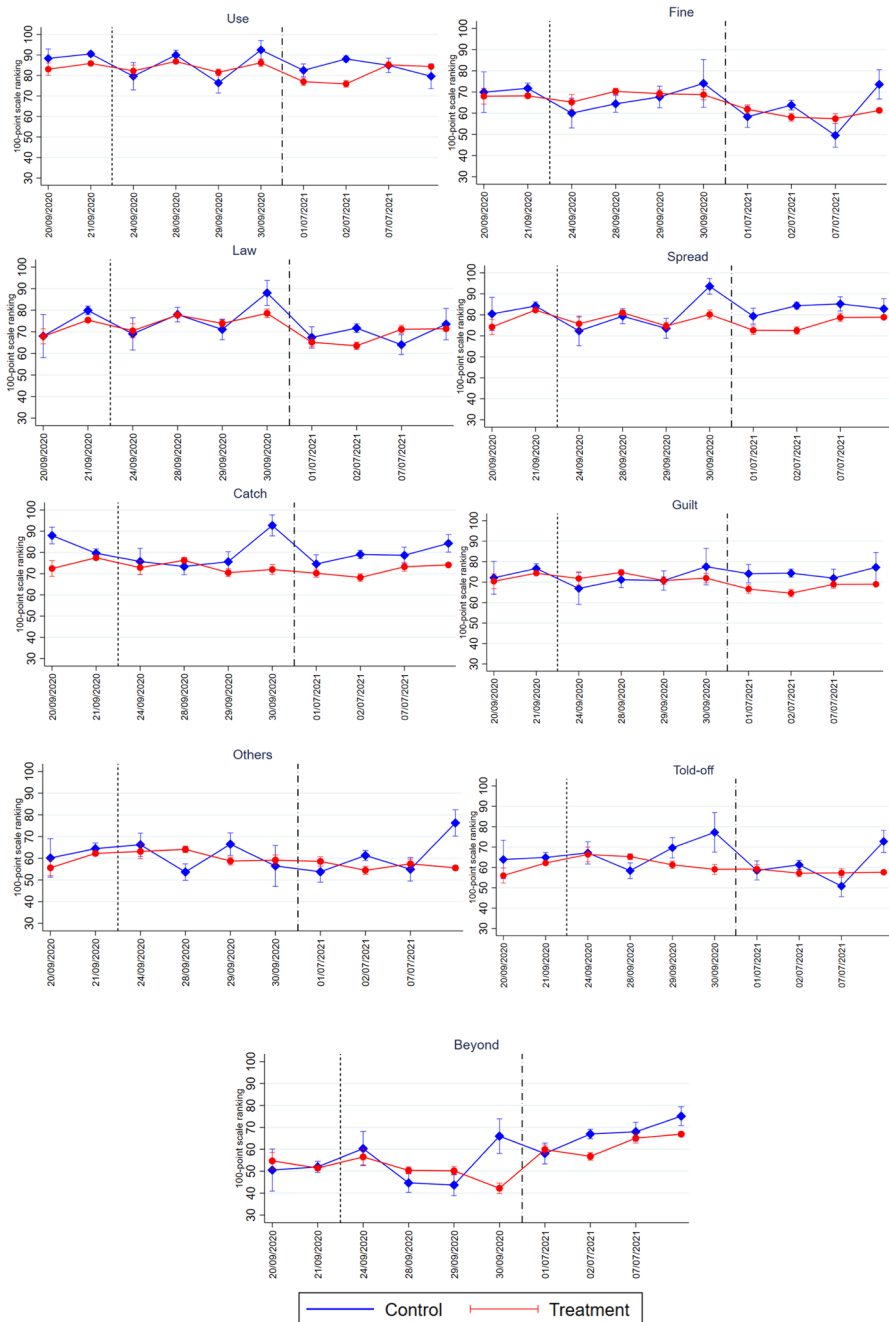
6.5 Use and motivation over time: fine revoked in England

In Fig. 5 below, we provide graphs for stated use and motivation over time before and after the removal of the fine in England on 19 July 2021 (represented by the long-dash line). Here, the treatment group is England only and the control group is Scotland, Wales and Northern Ireland as their fines remained in force.

As can be seen below, the mean values of *use* for the treatment group and control groups broadly moved together before the fine was revoked, albeit with some divergence in the lead up. However, following the fine being revoked, there is a clear downward shift for the treatment group that is not matched by the control group. A similar pattern can be found for many of the motivations. Three pronounced examples are wishing to abide by the *law*, avoid feelings of *guilt* and avoid being *told-off*—that track each other quite closely before the revocation, but that diverge afterwards. This pattern is in contrast to some other measures, such as not wishing to *catch* the virus and an intention to wear a mask *beyond* the current pandemic, that continue to track each other after the fine is revoked.

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[20] The number of observations per group, and rules for aggregation, can be found in the "Appendix".

[21] While motivations do on the whole move together, there is a notable exception for the control group mean for the group date beginning on 30–09–20 (for law, spread, catch, told-off and beyond), which is noticeably higher—however, this is likely to be sampling noise due to a relatively small number of observations in that group (See Table in "Appendix").

Fig. 4 Mean Values over the Sample Period—Fine Increases
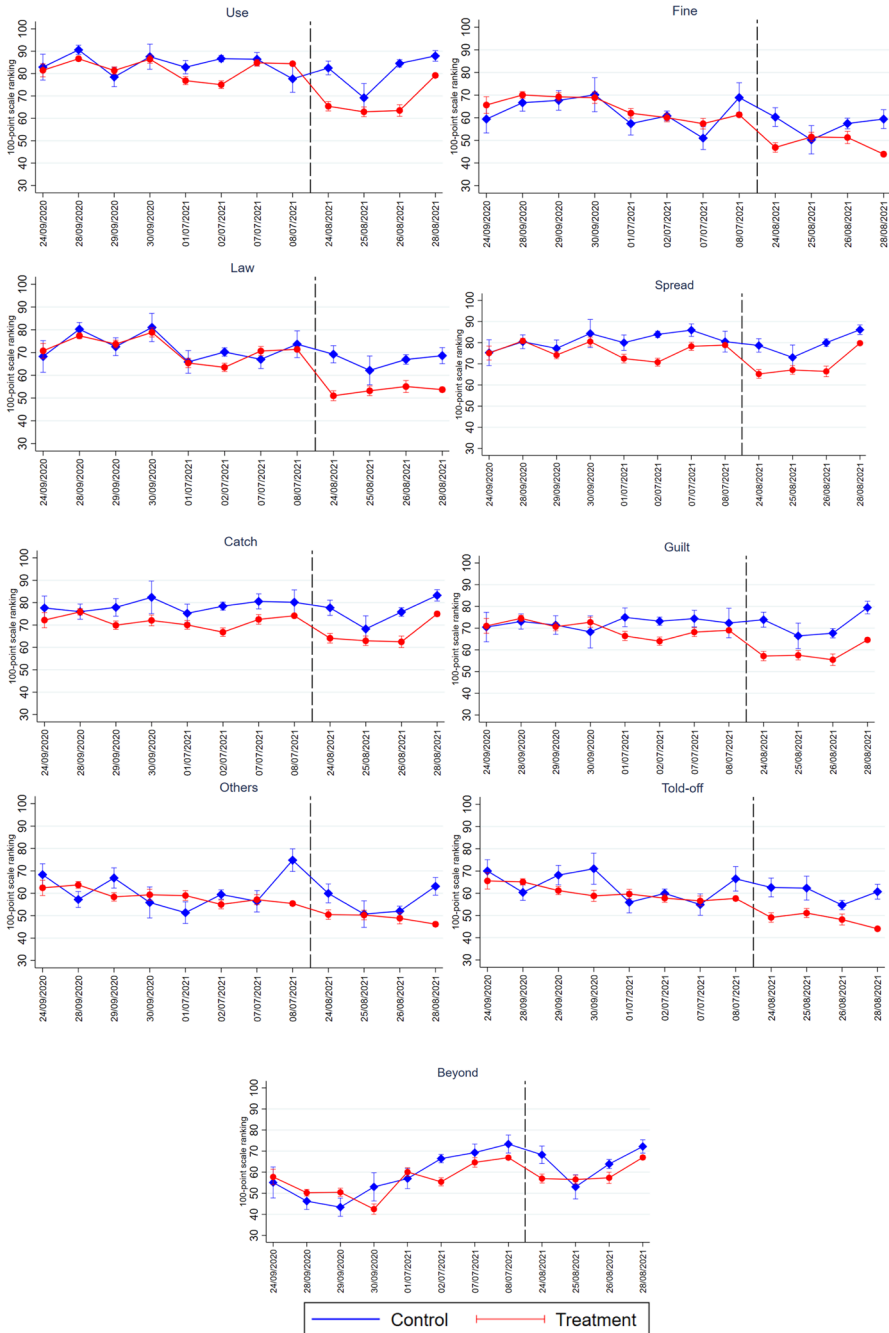
Fig. 5 Mean Values over the Sample Period—Fine Revoked

7 Econometric methods

The visual inspection of the descriptive statistics above finds little evidence of changes in stated use or motivation following the fine increases, relative to the control group. In contrast there are some pronounced downward movements in stated use and some motivations following the fine being revoked in England, relative to the control group. We aim to test these observations formally, using a difference-in-differences type estimation method using repeated cross-sectional data, while controlling for time fixed effects, country/region fixed effects and key demographic variables that may be correlated with use and motivation.[22] Time fixed effects are particularly important in this context, to capture time varying changes in vaccination and case rates (that were broadly similar across the UK).

The difference-in-differences estimations take the form:

$$c_{i,t,s} = \alpha_0 + \beta X'_{i,t,s} + \zeta \left(d^{post}_{i,t} . d^{treat}_{i,s} \right) + \omega_{i,t} + \varphi_{i,s} + \varepsilon_{i,t,s} \tag{1}$$

where $c_{i,t,s}$ denotes stated degree of compliance or motivation (from 0 to 100), for individual i, at day t, in nation/region, s. $X'_{i,t,s}$ represents a vector of characteristics (age, income, gender, and education) of individual respondent i, at time t, in region s. We estimate the above equation with time (day) fixed effects $\omega_{i,t}$, and nation/region fixed effects $\varphi_{i,s}$, for individual respondent i. The term α represents the intercept and ε represents the error term.

The key coefficient of interest ζ is of the interaction term ($d^{post}_{i,t} . d^{treat}_{i,s}$), which aims to measure the treatment effect (or the difference-in-differences estimator). This interaction term aims to capture the impact of the change in fine in the control group, relative to the control group.

We estimate the fine increase and revocation separately as the fine increase is effectively a movement along the intensive margin while the revocation is a move along the extensive margin. This removes the need to estimate reversable treatments which can be problematic (see De Chaisemartin and d'Haultfoeuille, 2020). As presented below, the null result for the fine increase should address potential concerns of contamination in the pre-period generated by dynamic treatment effects of the fine increase.

To measure the impact of the *fine increase*, the dummy $d^{post}_{i,t}$ takes the value of 1 for individual responses post the doubling of the fine (24 September 2020 for England and 12 November 2020 for Northern Ireland) and 0 otherwise, and the dummy $d^{treat}_{i,s}$ takes the 1 for individual responses from England and Northern Ireland, and 0 otherwise. When estimating this equation we exclude all responses after the revocation of the fine in England.

To measure the impact of *revoking the fine*, the dummy $d^{post}_{i,t}$ takes the value of 1 for individual responses after revoking the fine (19 July 2021) and 0 otherwise, and the dummy $d^{treat}_{i,s}$ takes the 1 for individual responses from England and 0 otherwise.

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[22] In the "Appendix", we also compare responses pre-and-post the fine increase and it being revoked using England only data. We estimate this equation as a robustness test to measure the change in the largest jurisdiction with the most dramatic policy changes.

When estimating this equation we exclude responses before the fine increase in England.

We adjust the standard errors for clustering at the country/region level, consistent with the quota sampling strategy. The level of which treatment (i.e. change in fine) is at the country level, however parts of England did experience regional COVID-19 measures during the sample period (however, not relating to facemask use).[23] As an additional robustness check, due to the small number of clusters (12), we apply Rademacher weighted cluster adjusted standard errors (Canay et al., 2021).

8 Results

Tables 3, 4, 5 below provide our key results for Eq. (1). In each table, the key coefficient of interest is the 'treat.post' dummy. These coefficients measure the average change in the treatment group, while controlling for movements in the rest of the UK and time specific factors (such as infection and vaccination rates).

Table 3 Fine increases

	Use	Fine	Law	Spread	Catch	Guilt	Others	Told-off	Beyond
Treat.Post	0.448	1.382	1.278	− 1.490	− 2.049	0.172	− 0.323	0.590	1.502
	(1.910)	(3.697)	(2.380)	(2.004)	(1.521)	(1.020)	(3.003)	(2.801)	(1.353)
Female	4.838***	5.110***	6.367***	6.850***	7.511***	7.736***	5.785***	6.725***	8.248***
	(0.730)	(0.816)	(0.902)	(1.030)	(0.878)	(0.940)	(0.739)	(0.824)	(0.937)
Education	− 0.452	− 0.840	− 0.944*	0.453	− 0.134	0.250	0.515	0.0915	1.094
	(0.313)	(0.913)	(0.501)	(0.262)	(0.426)	(0.421)	(0.783)	(0.921)	(0.615)
Age	3.744***	− 0.242	2.921***	3.710***	2.897***	2.947***	0.157	− 0.115	0.590**
	(0.284)	(0.326)	(0.218)	(0.208)	(0.362)	(0.257)	(0.257)	(0.282)	(0.259)
Income	0.465*	0.726**	0.887***	0.245	0.352	0.502	0.350	0.553*	0.181
	(0.220)	(0.251)	(0.178)	(0.248)	(0.257)	(0.349)	(0.398)	(0.261)	(0.192)
Constant	63.40***	62.79***	49.19***	48.63***	52.91***	45.27***	44.43***	46.61***	36.49***
	(4.464)	(5.864)	(4.912)	(3.802)	(3.438)	(3.941)	(5.250)	(5.291)	(4.029)
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4560	4560	4560	4560	4560	4560	4560	4560	4560
R2	0.085	0.031	0.059	0.063	0.046	0.045	0.016	0.023	0.075

Standard errors are in parentheses and clustered at the country/region level Scotland, Wales, Northern Ireland, North East, North West, Yorkshire and the Humber, East Midlands, West Midlands, East of England, London, South East, South West)

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

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[23] This sees the following 12 clusters (Scotland, Wales, Northern Ireland, North East, North West, Yorkshire and the Humber, East Midlands, West Midlands, East of England, London, South East, South West). The country level is the level at which treatment is applied and the dataset is stratified at the national and regional level.

Table 4 Fine revoked

	Use	Fine	Law	Spread	Catch	Guilt	Others	Told-off	Beyond
Treat.Post	−9.432**	−10.78***	−12.04**	−5.676**	−4.030*	−10.82***	−8.714***	−11.13***	−3.828
	(3.465)	(1.701)	(4.163)	(2.504)	(1.847)	(2.254)	(1.899)	(1.187)	(3.798)
Female	4.763***	3.253**	4.249***	6.397***	7.567***	6.830***	3.153***	3.969***	7.241***
	(0.552)	(1.160)	(0.868)	(0.902)	(1.024)	(0.613)	(0.709)	(1.145)	(0.943)
Education	0.461	0.262	0.430	0.950*	0.554	1.024*	1.433***	0.896	1.909***
	(0.532)	(0.642)	(0.568)	(0.448)	(0.322)	(0.491)	(0.422)	(0.661)	(0.420)
Age	3.955***	−1.040***	1.515***	3.537***	3.010***	2.725***	−1.117***	−1.374***	2.098***
	(0.310)	(0.293)	(0.323)	(0.230)	(0.244)	(0.255)	(0.271)	(0.231)	(0.355)
Income	0.548**	0.852***	0.959***	0.454*	0.418	0.652**	0.552	0.618***	0.401**
	(0.214)	(0.263)	(0.233)	(0.246)	(0.248)	(0.273)	(0.357)	(0.166)	(0.155)
Constant	86.45***	93.25***	90.93***	68.31***	53.15***	66.58***	55.35***	61.79**	20.50***
	(1.796)	(1.820)	(3.180)	(9.373)	(1.722)	(6.319)	(14.112)	(24.114)	(3.131)
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5699	5699	5699	5699	5699	5699	5699	5699	5699
R^2	0.106	0.083	0.097	0.066	0.051	0.051	0.039	0.065	0.073

Standard errors are in parentheses and clustered at the country/region level Scotland, Wales, Northern Ireland, North East, North West, Yorkshire and the Humber, East Midlands, West Midlands, East of England, London, South East, South West)

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

The results for the fine increases in England and Northern Ireland can be found in Table 3. The coefficient for *use* is close to zero and statistically insignificant. This result indicates that there is no discernible impact of the fine increases on stated mask use. It can also be seen that the magnitude of the coefficients for the motivations were small, ranging from − 0.33 over concern what *others* might think to − 2.05 for not wishing to *catch* the virus.

The results for revoking the fine in England can found in Table 4 below. The coefficient for *use* is − 9.43 and significant at the 5% level. This indicates that the revoking the fine is associated with an approximate 9% point fall in stated mask use, relative to the control group. The revocation is also associated with significant reductions in a number of motivations. The coefficient for wishing to avoid a *fine* is − 10.78 and significant at the 1% level, and the coefficient for not wishing to break the *law* is − 12.04, significant at the 5% level.[24] The revocation is also associated with a number of other motivations falling. Coefficients for both not wishing to *spread* or *catch* the virus fell moderately, with − 5.68 (at 5% significance) and − 4.03 (at 10% significance). The revocation is associated with large reductions in wearing masks to avoid feelings of guilt (− 10.83), concern over what others might think (− 8.71) and being told-off (− 11.13), each significant at the 1% level.

8.1 Robustness

Due to a relatively small number of clusters, we also report wild bootstrapped cluster adjusted standard errors (Cameron et al., 2008) for our variable of 'treat.post'. Based on the analysis of Canay et al. (2021), we report the p-values for wild bootstrapped tests based on Rademacher weights, given their high degree of validity.

As can in seen in Table 5, the significance levels for the fine increases are equivalent to above. The test statistics using cluster adjusted standard errors with

Table 5 UK-wide results—Summary of *Treat*

	Use	Fine	Law	Spread	Catch	Guilt	Others	Told − off	Beyond
Increase	0.45	1.38	1.28	− 1.49	− 2.05	0.17	− 0.32	0.59	1.50
p value	0.76	0.76	0.52	0.56	0.28	0.85	0.95	0.82	0.28
Obs	4560	4560	4560	4560	4560	4560	4560	4560	4560
R2	0.085	0.031	0.059	0.063	0.046	0.045	0.016	0.023	0.075
Revoke	− 9.43*	− 10.8**	− 12.0**	− 5.68*	− 4.03	− 10.8**	− 8.71**	− 11.1***	− 3.83
p value	0.066	0.039	0.044	0.092	0.12	0.036	0.022	0.0050	0.36
Obs	5699	5699	5699	5699	5699	5699	5699	5699	5699
R^2	0.11	0.083	0.097	0.066	0.051	0.051	0.039	0.065	0.073

Post variable with cluster adjusted standard errors with Rademacher weights. Wild bootstrap clustered with Rademacher weights at Country/Region level (Scotland, Wales, Northern Ireland, North East, North West, Yorkshire and the Humber, East Midlands, West Midlands, East of England, London, South East, South West) with 1000 iterations. These estimations include the same controls as above

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[24] Interestingly, these coefficients are lower than the England only results, consistent with these motivations also falling in the control group over the same period (See "Appendix" for England only results).

Rademacher weights show that the fine increase is associated with no change in stated use or motivation compared to the control group. The significance test statistics for the impact of the fine being revoked are similar to the results above, however, they are generally weaker. The *use* coefficient decreases from the 5% significance level with a *p* value of 0.066. In terms of motivations, the *spread* coefficient also decreases from the 5% level, with a p-value of 0.092. A number of motivation coefficient test-statistics' also move from the 1–5% levels, these being *fine* (0.039), *guilt* (0.036) and *others* (0.022). Not wishing to be *told-off* remains significant at the 1% level, while not wishing to *catch* the virus is no longer significant at the 10% level.

8.2 Summary of results

We have estimated the impact of increasing the fine not wearing a face mask, and it being revoked. We find no evidence that the fine increases in England and Northern Ireland led to an increase in stated mask use, or change in any motivation. However, when the fine was revoked in England, we find an approximate 9% point fall in stated mask use relative to the control group. We also find that revoking the fine is associated with significant changes in motivations for mask wearing. As would be expected, the motivation for not wishing to be fined or break the law fell significantly. However, in addition, we find that the removal of the fine is associated with significant declines in wishing to avoid feelings of guilt, concern over what others might think, and being told-off. Our results highlight a very different relationship between increasing a penalty versus removing it altogether. They provide evidence of what Scott (2000) terms as second order and third order motivations for legal compliance. In the following section, we discuss these findings in more detail, both in terms of their importance policy makers and with reference to the existing literature.

8.3 Limitations

It must be noted that our estimates are not without their limitations. First, there are some movements in the control group.[25] In particular, it can be seen From Figs. 2, 3, 4 that some motivations, particularly relating to the fear of being fined and not wishing to break the law fell in Scotland and Wales despite no change in headline penalty. The reasons for this are not clear. They could be capturing general 'mask fatigue', or changes in location specific enforcement efforts, or cross-jurisdictional spillovers which could see those in the other parts of the UK respond to changes in England even though the fine in their own country was unaffected (see Poortinga et al., 2013). If this was the case, comparing the UK-wide DID results with the England only results, suggests that

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[25] In the PM's announcement, he noted that devolved nations would be taking similar action at this time too. https://www.gov.uk/government/speeches/pm-commons-statement-on-coronavirus-22-september-2020. In terms of cases, it can be seen that the rest of the UK was in a very similar position to England, in that they were low, but rising (that eventually led to the second wave that peaked in December 2020-January 2021).

they may be biased downwards in some cases, and biased upwards for others. Also, the fine increase at a later date for Northern Ireland complicates our analysis. However, on the whole our UK-wide DID is highly consistent with our England only results (see "Appendix"). The second limitation relates to the data being self-reported rather than observed. All self-reported data, are likely to suffer from biases, especially if the respondent wishes to project an image of themselves in a favourable light [e.g. social desirability or self-image bias (see Schwarz & Oyserman, 2001; Browning et al., 2003; Feunekes et al., 1999; Lewicki, 1983)]. However, these biases would need to be systematically related to the magnitude or fine (or its removal) to affect our results or their interpretation. If such biases are driving our results, it would still point to the prevailing law influencing motivations, but in a significantly more complex set of mechanisms as proposed by the current literature. Also, it is not beyond possibility that some of the respondents were not aware of the fine increases in England and Northern Ireland, or its revocation in England. Our data show that the motivations for not wishing to be fined or break the law fell sharply in England following the revocation of the fine, the means for England after the fine was revoked were at 46 and 53 points respectively. While the mean for not wishing to be fined was below 50 (indicating disagreement with the statement), the mean for not wishing to break the law was just above it. These results (along with the standard deviations) indicate that indeed some respondents responded as if they were not aware of the change. However, this is likely to reflect the reality of any legal change, in that some citizens are not always aware of legal reforms. For example, MacCoun et al. (2009) report citizens' beliefs over whether they could be imprisoned for cannabis possession are similar across US states, regardless of whether possession has been decriminalised or not. The new measures received widespread national news media attention, including 'front-page' coverage in a number of national newspapers. While it could be possible that certain demographics were less aware than others, our econometric estimations control for key demographics variables, including age, that should validate our results in this regard.

9 Discussion and conclusion

9.1 Key Insights

When the fine was doubled, we found no impact on stated compliance—or moral or social norms. However, when it was revoked, it did impact stated compliance—and moral and social norms. In particular, we found that when the fine was revoked in England it led to large reductions in motivations associated with feelings of guilt, concerns over what others might think and being told-off by others. These results imply that the prevailing law does impact moral and social norms and that impact looks to be driven by the legal status of the behaviour—that is, if the behaviour is illegal or not—and not the magnitude of the penalty. In doing so, we add to the literature by providing evidence that at least part of the reason that 'legal rules mirror moral rules', is because people adjust their moral rules to align with the legal ones.

Our results also provide empirical support for Scott's (2000) typology, which formed the theoretical basis for our empirical strategy. Of most importance, when the fine was revoked, we found evidence for what he labels as second and third order effects. In terms of second order effects, we found high magnitude reductions in the motivations of worrying what others might think and fear of being told-off (approximately 9 and 11% points respectively). This provides evidence that the removal of the fine influenced perceptions of non-state enforcement activity and social norms. In terms of third order effects, we found that feelings of guilt fell by approximately 11% points when the fine was revoked. This provides evidence that the prevailing law can see people self-sanction through feelings of guilt.[26]

Our results seem to be of higher magnitude than previous studies. For example, in relation to same sex marriage, Aksoy et al. (2020) found a relatively small impact of legal change on moral norms (3.6% point increase), while Tankard and Paluck (2017) found no impact on moral attitudes (but did find an impact on social norm perceptions). One reason for difference results, could the timescale of the sample period, in that Aksoy et al. measured attitudes over 10 year period, whereas Tankard and Paluck (2017) measured attitudes over a 5 month period. Larcom et al (2019) found that the introduction of a legally enforceable 5-pence charge on plastic bags led to a 3.7% point increase in intrinsic motivation over 7-week period. Our results, which range from 9 to 11% points were over a relatively short timeframe. Also, it must be noted that our study relates to a revocation of a fine, and that the subject matter is different to the other studies, so in some sense we have no direct comparators. More research is required to measure the impact of legality, both in terms of instatement versus revocation; on a range of different behaviours, ranging from the trivial to the profound; over both the short-run and long-run; and in a range of different societies, from those where the state has a high degree of legitimacy to where it doesn't. Only once this is done, will we properly begin to understand how, when and to what degree legality shapes moral and social norms.

While we found the revocation of the fine influenced moral and social norms, we found no impact associated with the fine increase. Here, on the impact of different magnitudes, the mainly experimental, literature is mixed. For instance, Mulder et al (2009) found larger fines increased moral disapproval while Feldman and Perez (2009) found that the magnitude sanctions did not generate significantly different moral reactions from their participants. In our case, we know is that prior to the fine increases, there was already a high, albeit not universal, degree of compliance. The mean value for use in England just prior to the fine increase was already approximately 86%. This is in contrast to the early days of the pandemic, just before the first nationwide lockdown (20 March 2020) and well before they became mandatory, when less than 5% of the UK public had worn a facemask and only 20 around

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[26] This of course assumes that guilt and moral norms are directly connected with one another, which they do seem to be (see Tangney et al., 2007).

percent considered them to be an effective preventive measure (Atchison et al., 2020).[27] While we do not have the data to estimate the initial impact of the initial fine, it does seem that its magnitude was sufficient, along with the other motivators, to enable widespread use. This implies that there may be a non-linear relationship between the magnitude of a fine and its impact on moral and social norms. However, this is speculative and would require testing, which would seem to be a fruitful avenue for further research.

9.2 Contextual factors

While we consider that our study carries a sufficient degree of external validity, we wish to highlight several factors to help the reader better understand and contextualise our results.

First, it must be highlighted that in our case, non-legal motivations for wearing facemasks were important. Our data show that public health concerns, wishing to limit the spread of the disease and issues of self-preservation were all reported as being important motivators throughout our sample period.

Second, while the headline penalty increased, the probability of being fined was low, both before and after the increase. When the then UK Prime Minister spoke of increasing policing and enforcement when announcing the fine increase in England,[28] as did some police chiefs soon after, it had been widely reported that enforcement had been relatively low.[29] When fines for non-compliance were first introduced in mid-July, the Police Federation said it was 'unrealistic and unfair' to expect police to patrol the shopping aisles.[30] Indeed, between 15 June and 21 December 2020, only 958 fines were issued for violating the rules on facemasks, in a country of approximately 60 million people where non-universal compliance was known and

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[27] This was in contrast with many other countries at the time, particularly in East Asia, where there was a high degree of use that increased further during outbreaks. For instance, Hong Kong, had almost universal adherence to wearing masks in public (97.5%) during an outbreak in 2020, without mandatory requirements (Cowling et al., 2020). Pre-existing mask wearing norms in East Asia have been attributed to previous experience with containing the spread of severe acute respiratory syndrome (SARS), culture (including collectivist versus individualistic viewpoints), religion, and notions around individual personal responsibility (Burgess & Horii, 2012; Huang & Morawska, 2019).

[28] When announcing the doubling of the fine on 22 September in England, two days before it came into force, the Prime Minister said there would be increased enforcement activity, in particular stating that '[w]e will provide …a greater police presence on our streets, and the option to draw on military support where required to free up the police.' PM Commons Statement on Corona Virus, 22 September 2020, https://www.gov.uk/government/speeches/pm-commons-statement-on-coronavirus-22-september-2020.

[29] West Mercia Police chief issues fine warning for Covid-19 restriction dodgers. *Advertizer* https://www.bordercountiesadvertizer.co.uk/news/18742820.west-mercia-police-chief-issues-fine-warning-covid-19-restriction-dodgers/.

[30] John Apter, chairman of the Police Federation of England and Wales, said: "Policing the wearing of face coverings in shops can't be a priority because we simply don't have the resources. 'Unrealistic and unfair' to expect police to enforce face coverings in shops, says Police Federation. *The Telegraph* https://www.telegraph.co.uk/global-health/science-and-disease/coronavirus-news-face-masks-transport-compulsory-cases-deaths/.

observed.[31] Given these numbers, few shoppers would have witnessed anyone being fined for non-compliance. This highlighting the importance of actual enforcement effort, *p*, over headline penalties, *f* (see Chalfin & McCrary, 2017).

Also, when the fine was revoked in England we found that it was associated with an approximate 9% point fall in stated use, compared to the control group that also fell slightly in this period. While this is a significant fall, it is noteworthy that stated average mask use in England remained quite high, with a mean of 75 points in the sample period after the removal of the fine.[32] It must be noted that while the government revoked the fine in England, it still *recommended* the use of face masks in crowded and enclosed spaces.[33] Also, many shops and supermarkets asked their customers to continue to wear face masks with large signs situated at the entrance to their stores.[34]

10 Conclusion

Using facemask fines in the UK we tested for whether the prevailing law can influence moral and social norms. We found that the legality of an act, rather than the magnitude of the penalty, to be an important factor in shaping social and moral norms. Our results suggest a high degree of legitimacy of legal authority in the UK. In one respect this is not surprising, given its ancient, and largely uninterrupted, origins and its strong democratic institutions. But on the other hand, it is, given the stated decline of legitimacy in many Western democracies (Tyler, 2023) and the very public scandals surrounding non-compliance with pandemic laws by UK lawmakers.[35] Our results suggest that many UK citizens do accept the authority of the law of the state to help guide moral and social norms.

Appendix

See Figs. 6 and 7.

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[31] Fewer than 1,000 people fined for refusing to wear face masks in England and Wales. *Independent* https://www.independent.co.uk/news/uk/home-news/coronavirus-face-mask-law-fines-police-b1784406.html.

[32] This figure accords with other accounts at the time. See for example, https://www.theguardian.com/world/2021/jul/30/95-of-british-adults-still-wearing-a-mask-outdoors-says-survey.

[33] Prime Minister Confirms Move to Step 4 available: 12 July: Available at: https://www.gov.uk/government/news/prime-minister-confirms-move-to-step-4.

[34] For instance, the UK's largest retailer Tesco used a sign saying: 'Let's be on the safe side: Please use a face covering in-store if you can' while another major retailer Sainsbury's had signs saying 'Wearing a face covering is now a personal choice: For the safety of our colleagues and customers please continue to wear a face covering if you can.

[35] https://www.newstatesman.com/science-tech/coronavirus/2021/12/timeline-all-the-lockdown-breaches-by-politicians-and-government-employees-so-far.
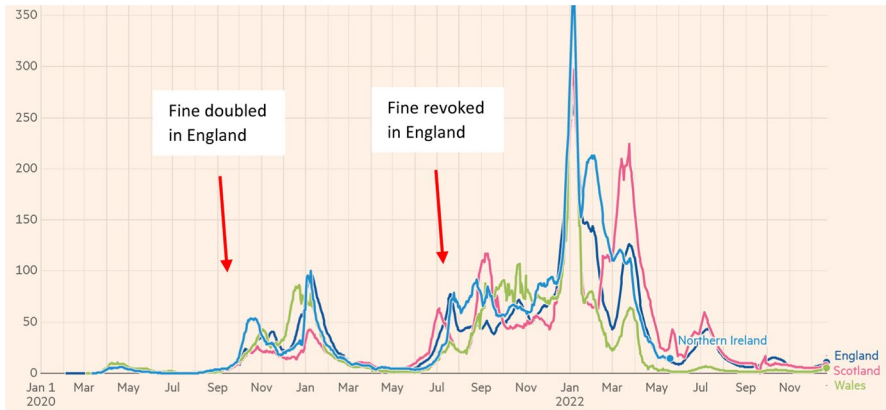
Fig. 6 New confirmed cases of Covid-19 in England, Scotland, Wales and Northern Ireland: Seven-day rolling average of new cases (per 100 k). *Source*: Financial Times, Fine doubled in England on 24 Sept 2020 and revoked in England on 19 July 2021

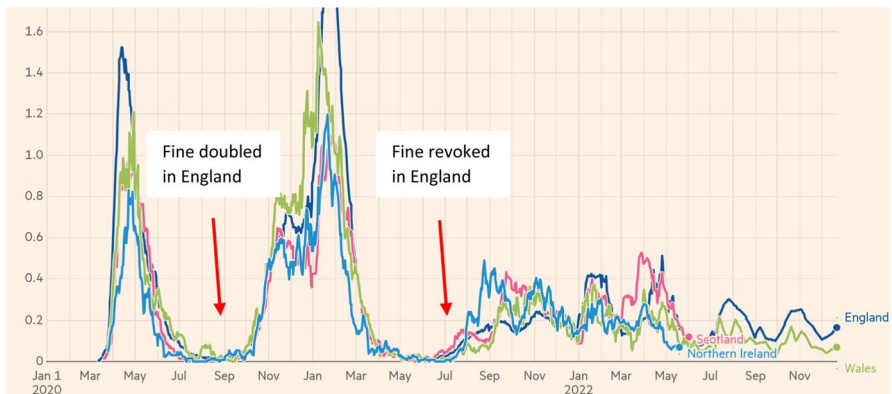**Fig. 7** New deaths attributed to Covid-19 in England, Scotland, Wales and Northern Ireland: Seven-day rolling average of new deaths (per 100 k): Fine doubled in England on 24 Sept 2020. *Source*: Financial Times, Fine doubled in England on 24 Sept 2020 and revoked in England on 19 July 2021

Data

Individual-level data were collected via three waves.

See Table 6, 7, 8, 9.

Table 6 Observations by day and aggregation by group

Date	England	Northern Ireland	Scotland and Wales	Group	Total
20/9/2020	79	2	15	G1	96
21/9/2020	878	21	153	G2	1052
22/9/2020	1	1	0		2
23/9/2020	4	2	1		7
24/9/2020	2	0	0	G3	2
25/9/2020	15	1	1		17
26/9/2020	22	1	4		27
27/9/2020	28	1	10		39
28/9/2020	446	13	67	G4	526
29/9/2020	273	10	34	G5	317
30/9/2020	176	9	11	G6	196
01/7/2021	222	2	35		259
02/7/2021	246	3	22	G7	271
03/7/2021	4	10	51		65
04/7/2021	0	7	42		49
05/7/2021	2	14	45		61
06/7/2021	0	12	49		61
07/7/2021	204	9	42	G8	255
08/7/2021	393	2	3	G9	398
09/7/2021	416	0	9		425
10/7/2021	232	0	0		232
11/7/2021	169	4	1		174
12/7/2021	12	0	1		13
13/7/2021	16	0	0		16
24/8/2021	236	0	44	G10	280
25/8/2021	193	3	24	G11	220
26/8/2021	159	2	23	G12	184
27/8/2021	1	41	167		209
28/8/2021	27	13	39	G13	79
29/8/2021	879	8	10		897
30/8/2021	66	0	0		66
31/8/2021	243	4	0		247
01/9/2021	77	0	0		77
02/9/2021	37	0	0		37
Sum	5758	195	903		6856

Rules of aggregation for the line graphs are based on a trade-off of trying to have as many graphical observations as possible to show the evolution of time trends while also aiming to minimise sampling noise. Rules for Aggregation are: 1. It is not allowed to aggregate days across the day of policy change or different waves. 2. When the observations of Scotland & Wales are equal or less than 10, we trigger the process of aggregation. 2A We sum up the days in order (from earlier to later) until the observations of Scotland & Wales are equal or more than 14. 2B If the observations of Scotland & Wales couldn't sum up to 14 before the day of policy change (or different waves), then we sum up the observations of Scotland & Wales backward (from later to earlier). 3 After checking Scotland and Wales, we check the observations of England. If the observations of England are less than 5, then it triggers the aggregation. The observations of England would be summed up from later to earlier until the observations of England are equal or more than 14

Table 7 Descriptive statistics: fine increase

Fine increases

	All Sample				Control				Treat			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Use	84.27	23.9	0	100	86.34	22.47	0	100	83.12	24.59	0	100
Fine	64.7	32.29	0	100	67.14	32.06	0	100	63.36	32.34	0	100
Law	72.7	28.61	0	100	74.58	28.05	0	100	71.66	28.87	0	100
Spread	79.18	27.6	0	100	82.04	25.76	0	100	77.61	28.44	0	100
Catch	74.6	29.56	0	100	77.76	27.88	0	100	72.86	30.31	0	100
Guilt	71.19	30.33	0	100	74.06	29.27	0	100	69.61	30.79	0	100
Others	59.06	32.53	0	100	61.58	32.43	0	100	57.68	32.5	0	100
Told-off	60.33	31.14	0	100	62.01	31.05	0	100	59.4	31.16	0	100
Beyond	57.55	32.93	0	100	54.02	32.16	0	100	59.49	33.19	0	100
Age	4.637	1.647	2	7	4.715	1.693	2	7	4.594	1.62	2	7
Income	3.527	2.013	1	8	3.385	1.856	1	8	3.605	2.09	1	8
Female	1.505	0.5	1	2	1.544	0.498	1	2	1.484	0.5	1	2
Education	2.724	0.915	1	5	2.685	0.888	1	5	2.745	0.93	1	5
N	4560				1619				2941			

Table 8 Descriptive statistics: fine revoked

Fine revoked

	All Sample				Control				Treat			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Use	80.55	27.03	0	100	83.6	24.31	0	100	74.53	30.84	0	100
Fine	57.02	34.24	0	100	62.78	32.68	0	100	45.67	34.42	0	100
Law	65.3	31.96	0	100	71.33	29.04	0	100	53.43	34.06	0	100
Spread	77.51	28.39	0	100	78.48	27.79	0	100	75.6	29.45	0	100
Catch	73.08	30.24	0	100	73.93	29.75	0	100	71.39	31.11	0	100
Guilt	67.48	31.66	0	100	70.16	30.55	0	100	62.2	33.13	0	100
Others	54.25	33.13	0	100	57.75	32.53	0	100	47.36	33.22	0	100
Told-off	54.85	32.26	0	100	59.48	31.09	0	100	45.72	32.58	0	100
Beyond	61.37	32.97	0	100	60.1	32.98	0	100	63.89	32.8	0	100
Age	4.63	1.639	2	7	4.619	1.617	2	7	4.654	1.681	2	7
Income	3.593	2.069	1	8	3.569	2.059	1	8	3.639	2.088	1	8
Female	1.489	0.5	1	2	1.487	0.5	1	2	1.494	0.5	1	2
Education	2.758	0.945	1	5	2.748	0.934	1	5	2.779	0.967	1	5
N	5699				3781				1918			

Table 9 Description of Variables

Variable	Description
Age	A categorical variable of age groupings. A value of 1 indicates that a respondent is under 18 years old. A value of 2 indicates that a respondent is between 18 and 24 years old. A value of 3 indicates that a respondent is between 25 and 34 years old. A value of 4 indicates that a respondent is between 35 and 44 years old. A value of 5 indicates that a respondent is between 45 and 54. A value of 6 indicates that a respondent is between 55 and 64 years old. A value of 7 indicates a respondent is equal to or over 65 years old
Income	A categorical variable of annual income. A value of 1 indicates an income of less than £15,000. A value of 2 indicates an income of between £15,000 to £20,000. A value of 3 indicates an income of between £20,001 to £30,000. A value of 4 indicates an income of between £30,0001 to £40,000. A value of 5 indicates an income of between £40,0001 to £50,000. A value of 6 indicates an income of between £50,001 to £60,000. A value of 7 indicates an income of between £60,001 to £70,000. A value of 8 indicates an income equal to or greater than £70,000
Female	A categorical variable of gender. A value of 1 indicates that the respondent is a male. A value of 2 indicates that the respondent is a female
Education	A categorical variable denoting respondents' highest level of education. A value of 1 indicates basic education. A value of 2 indicates secondary education. A value of 3 indicates undergraduate education. A value of 4 indicates a masters or equivalent. A value of 5 indicates doctoral level
Use	A 100-point scale ranking of the degree to which respondent's agreed with the following statement: When I go to a shop, I wear a face covering. (0 is for strongly disagree, 100 is for strongly agree)
Fine	A 100-point scale ranking of the degree to which respondent's agreed with the following statement: I wear a face covering in shops because I do not want to be fined. (0 is for strongly disagree, 100 is for strongly agree)
Law	A 100-point scale ranking of the degree to which respondent's agreed with the following statement: I wear a face covering in shops because I do not want to break the law. (0 is for strongly disagree, 100 is for strongly agree)
Spread	A 100-point scale ranking of the degree to which respondent's agreed with the following statement: I wear a face covering in shops because I want to reduce the spread of COVID-19. (0 is for strongly disagree, 100 is for strongly agree)
Catch	A 100-point scale ranking of the degree to which respondent's agreed with the following statement: I wear a face covering in shops because I do not want to catch COVID-19. (0 is for strongly disagree, 100 is for strongly agree)
Guilt	A 100-point scale ranking of the degree to which respondent's agreed with the following statement: If I did not wear a face covering in shops I would feel guilty. (0 is for strongly disagree, 100 is for strongly agree)
Others	A 100-point scale ranking of the degree to which respondent's agreed with the following statement: If I did not wear a face covering in shops I would worry what other people think of me. (0 is for strongly disagree, 100 is for strongly agree)
Told-off	A 100-point scale ranking of the degree to which respondent's agreed with the following statement: If I did not wear a face covering in shops I would worry that I would be told off. (0 is for strongly disagree, 100 is for strongly agree)
Beyond	A 100-point scale ranking of the degree to which respondent's agreed with the following statement: I plan on wearing face coverings in shops beyond the current COVID-19 pandemic. (0 is for strongly disagree, 100 is for strongly agree)

England only estimation

For England only data, we compare responses before and after the increase in fine, and, before and after it is revoked. This enables us to measure the changes in our variables in England, the largest country within the UK and the one with the most variation in fine, controlling for key demographic and regional characteristics. It takes the form:

$$c_{i,t,s} = \alpha_0 + \beta X'_{i,t,s} + \zeta d^{post}_{i,t} + \varphi_{i,s} + \varepsilon_{i,t,s} \tag{2}$$

where $c_{i,t,s}$ denotes stated degree of compliance or motivation (from 0 to 100), for individual i, at day t, in region, s. $X'_{i,t,s}$ represents a vector of characteristics (age, income, gender, and education) of individual respondent i, at time t, in region s. $\varphi_{i,s}$ represents region fixed effects for individual respondent i. The term α represents the intercept and ε represents the error term.

The key coefficient of interest is from the variable $d^{post}_{i,t}$, which is a dummy variable. This term aims to capture the associated change in stated compliance and motivation in England only, from the change in fine.

When measuring the change in stated compliance and motivation following the fine *increase*, it takes the value of 1 for individual responses after the increase in fine (24 September 2020) and 0 before. When estimating this equation we exclude the responses after the revocation of the fine.

When measuring the change in stated compliance and motivation following the *revocation* of the fine, it takes the value of 1 for individual responses after the revocation (19 July 2021) and zero before. Consistent with above, when estimating this equation we exclude responses before the fine increase.

England only results

Tables 10, 11, 12 below provide our key econometric results from Eq. (2) using data for England only. In each table, the key coefficient of interest is that of the 'post' dummy. While these results do not provide insight into the causal impact of the fine changes, they are nonetheless very useful in gauging the change in mask use and motivations before and after the fine changes in England, while controlling for key demographic variables.

Following the fine increase (Table 10), the coefficient for *use* is approximately -2 and is weakly significant (at the 10% level). This result indicates that mask use in England fell slightly in the period after the fine increase and before its removal. It can also be seen that the motivations for wearing masks fell during this period (except for concern for being told-off).

Following the fine revocation (Table 11), the coefficient for *use* is -8.99 and highly significant (at the 1% level). This indicates that mask use fell by approximately 9% points in England after the fine was revoked. It can also be seen motivations for wearing masks fell in this time period, and as would be expected, the biggest reductions were from avoiding a *fine* at -17.9 and not wishing to break the *law* at -18.52. In percentage terms, these declines were particularly large.

Table 10 England only data—Change after fine increased (£100 to £200)

	Use	Fine	Law	Spread	Catch	Guilt	Others	Told-off	Beyond
Post	− 2.016*	− 4.516**	− 2.626**	− 3.505**	− 3.602**	− 3.836***	− 3.577**	− 1.890	8.481***
	(0.951)	(1.409)	(0.829)	(1.167)	(1.486)	(0.880)	(1.316)	(1.277)	(1.210)
Female	4.459***	4.033***	5.064***	5.870***	7.023***	6.633***	3.948***	5.730***	7.837***
	(0.470)	(0.863)	(0.821)	(0.853)	(0.928)	(0.850)	(1.091)	(0.798)	(1.403)
Education	− 0.466	− 0.720	− 0.892	0.593	− 0.174	0.491	0.417	0.405	1.804**
	(0.364)	(0.950)	(0.530)	(0.324)	(0.467)	(0.414)	(0.821)	(0.887)	(0.649)
Age	3.664***	− 0.0317	2.938***	3.536***	2.801***	2.775***	0.178	0.00994	1.093***
	(0.268)	(0.440)	(0.269)	(0.195)	(0.303)	(0.311)	(0.391)	(0.350)	(0.268)
Income	0.613**	0.883***	1.037***	0.476**	0.538*	0.723*	0.620	0.712**	0.308
	(0.199)	(0.200)	(0.179)	(0.204)	(0.237)	(0.338)	(0.445)	(0.231)	(0.230)
Constant	63.12***	62.84***	55.54***	53.69***	53.88***	47.79***	51.93***	50.92***	29.54***
	(2.093)	(4.834)	(2.947)	(1.731)	(1.951)	(2.234)	(4.263)	(2.873)	(3.167)
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time	No	No	No	No	No	No	No	No	No
Observations	3840	3840	3840	3840	3840	3840	3840	3840	3840
R^2	0.074	0.010	0.040	0.050	0.035	0.034	0.007	0.011	0.029

Standard errors are in parentheses and clustered at the regional level

*$p<0.10$, **$p<0.05$, ***$p<0.01$

Table 11 England only data—Change after fine is revoked (£200 to £0)

	Use	Fine	Law	Spread	Catch	Guilt	Others	Told-off	Beyond
Post	− 8.997***	− 17.92***	− 18.52***	− 2.280***	− 1.687**	− 7.732***	− 10.44***	− 13.79***	4.158***
	(1.050)	(1.529)	(1.930)	(0.425)	(0.624)	(1.129)	(0.716)	(1.031)	(0.706)
Female	4.614***	3.091**	3.384***	5.671***	7.161***	6.414***	2.771**	3.861**	7.418***
	(0.545)	(1.098)	(0.822)	(0.892)	(1.162)	(0.799)	(1.176)	(1.196)	(1.324)
Education	0.419	0.309	0.587	0.995	0.546	1.230*	1.350**	1.268*	2.204***
	(0.650)	(0.699)	(0.676)	(0.559)	(0.400)	(0.555)	(0.472)	(0.677)	(0.495)
Age	4.305***	− 0.994***	1.495***	3.782***	3.288***	2.785***	− 0.764	− 1.219***	2.731***
	(0.183)	(0.295)	(0.387)	(0.188)	(0.209)	(0.260)	(0.472)	(0.333)	(0.398)
Income	0.722***	0.974***	1.056***	0.689**	0.650**	0.834**	0.667	0.699***	0.589***
	(0.212)	(0.252)	(0.263)	(0.213)	(0.231)	(0.254)	(0.436)	(0.167)	(0.107)
Constant	54.46***	60.90***	56.71***	47.52***	44.93***	41.80***	52.03***	55.14***	27.59***
	(2.181)	(2.366)	(3.030)	(2.568)	(2.435)	(2.449)	(3.717)	(1.861)	(3.980)
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time	No	No	No	No	No	No	No	No	No
Observations	4796	4796	4796	4796	4796	4796	4796	4796	4796
R^2	0.093	0.078	0.090	0.050	0.038	0.040	0.034	0.058	0.034

Standard errors are in parentheses and clustered at the regional level

*$p<0.10$, **$p<0.05$, ***$p<0.01$

Table 12 Summary of Post variable with cluster adjusted standard errors with Rademacher weights

	Use	Fine	Law	Spread	Catch	Guilt	Others	Told-off	Beyond
Increase	− 2.02**	− 4.52**	− 2.63**	− 3.50***	− 3.60**	− 3.84***	− 3.58**	− 1.89	8.48***
p value	0.043	0.0039	0.012	0.0039	0.047	0	0.035	0.17	0
Obs	3840	3840	3840	3840	3840	3840	3840	3840	3840
R2	0.074	0.010	0.040	0.050	0.035	0.034	0.0071	0.011	0.029
Revoke	− 9.00***	− 17.9***	− 18.5***	− 2.28***	− 1.69***	− 7.73***	− 10.4***	− 13.8***	4.16***
p value	0	0	0	0	0.023	0	0	0	0
Obs	4796	4796	4796	4796	4796	4796	4796	4796	4796
R2	0.093	0.078	0.090	0.050	0.038	0.040	0.034	0.058	0.034

Wild bootstrap clustered with Rademacher weights at Country/Region level (Scotland, Wales, Northern Ireland, North East, North West, Yorkshire and the Humber, East Midlands, West Midlands, East of England, London, South East, South West) with 1000 iterations. The estimations include the controls as above

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

Some other motivations also fell significantly, especially not wishing to be *told-off* − 13.79, worried about what *others* might think − 10.44, and *guilt* − 7.72.

In addition to measuring the changes in use and motivation after the changes in the fine, the econometric results provide insight into the demographic characteristics of mask users and motivations in England. *Female* respondents are more likely to *use* masks, and have higher levels of motivation across the board. The level of education is not correlated with mask *use* or most motivations for wearing facemasks. Level of income is also correlated with *use* and some motivations—especially wishing to obey the *law,* avoid a *fine* and limit the *spread*.

Due to the small number of clusters, we also report wild bootstrapped cluster adjusted standard errors (Cameron et al., 2008) for our variable of interest 'post'. Based on the analysis of Canay et al. (2021), we report the p-values for wild bootstrapped tests based on Rademacher weights. As can be seen, the significance levels are very similar to the tables above, with the one notable exception being the *use* coefficient after the fine increase, which moves from the 10–5% significance level.

Declarations

Conflict of interest The authors declare no competing interests.

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