

The problem and the productivity of ignorance: public health campaigns on antibiotic stewardship

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Introduction

Antimicrobial resistance (AMR) has become a focus of health policy in recent years. This resistance is narrated as a looming catastrophe, the result of dangerous multi-drug-resistant organisms ('superbugs') and of market failure (the 'empty pipeline' in antibiotic development). As Brown and Nettleton (2017) describe, UK versions reveal 'an economic imaginary' at the highest levels of government, hoping for technological fixes including new antibiotics from novel innovation models. This paper shows a different economic imaginary in play in the application of ideas from behavioural economics ('nudge') to the problem of AMR. By comparing and contrasting efforts to reduce antibiotic use while waiting for new drugs I argue that current concern about AMR points to fundamental difficulties for public health in thinking about ordinary people as reflective, and efforts to deal with claims to lay and expert ignorance. As a result I identify several shifts in approach, including a strategic retreat from communicating information, which I characterize as a 'shrug' to accompany the nudge.

The paper adds to our understanding of responses to AMR by analysing public health strategies for encouraging 'antibiotic stewardship'. Though sharing Brown and Nettleton's (2017) interest in the framing of AMR, where they quote elite actors such as the Chief Medical Officer for England or the Prime Minister I look to the work of largely nameless public health workers seeking to reduce use of antibiotics for viral illnesses or minor infections. As most antibiotics are only formally available on prescription in the UK it might seem that this would lead to efforts to influence health professionals. However sociological

work is used to justify efforts to engage with ordinary people. For example Britten and Ukoumunne (1997) is widely cited as evidence that patients' desire for an antibiotic affects prescription – implying that people can put pressure on doctors to access medicines. Such citations are the foundation for efforts to involve ordinary people with AMR, but these efforts are shaped by a focus on 'behaviour' that owes more to particular versions of psychology and economics than to sociology.ⁱ

A key recent influence on public health practice in the UK has been the rise of behavioural economics. The term refers to a subfield of economics that sets aside its more typical assumption that individuals are making rational choices. The word 'nudge' was popularised by Thaler and Sunstein (2009) in a book proposing that governments harness non-reflective forms of thinking including 'anchoring' (relying heavily on one piece of information), 'availability heuristics' (thinking in relation to the most recent or common experience) and 'following the herd' (being strongly influenced by what other people are doing). They recommended using modest interventions to exploit such non-reflective or automatic thinking so that the choice preferred by government was also the easiest. A nudge is any intervention designed to alter behaviour without forbidding options or significantly altering economic incentives. One of the most extended discussions of the influence of this approach appears in cultural geography on the rise of psychological expertise in UK government (Jones et al 2013, Pykett et al 2016). Though Foucauldian concepts have long been used in sociology of public health (e.g. Armstrong 1993) these authors offer detailed accounts of new versions of governmentality drawing on behavioural economics in the last ten years.ⁱⁱ

Some sociologists see in nudge a welcome acknowledgement of social and environmental factors shaping decisions. As Brown (2012) says, policy interest in this approach may be an opportunity for our discipline, which also engages with the social and material context of action. However he also asks for more critical investigation of the assumptions behind specific initiatives, interests served by them, and possible longer term 'side effects' (p306). Studies of nudge in practice often complain that interventions focus attention back on the individual and their 'choices' rather than fulfilling the promise of a more social account of action (Cranshaw 2013, Haydock 2014, Carter 2015). Meanwhile political scientists argue that behavioural economics reduces the scope for citizens to be imagined as capable of autonomy and democratic involvement (e.g. Rebonato 2014)ⁱⁱⁱ and John et al (2009) explicitly call on governments to retain opportunities for more deliberative engagement with citizens. Such deliberative modes have been theorized in work in Science and Technology Studies (STS) on public involvement with scientific knowledge, to which I now turn.

Though STS has had rather little to say about behavioural economics specifically, it shares with geography, sociology and political science a broader interest in relationships between citizens and the state. This is expressed in discussion of the forms of citizenship enacted when people are mobilized around scientific work (e.g. Irwin 2001) and more recent discussion of issue-based publics (Marres and Lezaun 2011). Deliberative events have been of particular interest as occasions for 'constructing, engineering or performing [such] publics' (Felt and Fechter 2010), but a few scholars explore how more mundane research

methods may be used to produce public voices, including surveys (Law 2009) and interviews (Michael 1996). Wynne (1996) famously complains that apparently deliberative events are often framed more around communicating 'propositional knowledge' than generating richer understandings through lay experiences, and others argue that publics in such events are viewed as lacking as experts try to preserve 'epistemic asymmetry' between knowledgeable science and lay ignorance (Maranta et al 2003, p153) or seek out people focused on their own private affairs ('idiots' not stakeholders, Lezaun and Soneryd 2007). Identifying ignorance in others is a way of claiming status for experts. However, Michael (2012) argues that claims to ignorance may also be a lay strategy, where misbehaviour (absence, refusal, disruption, distraction, irony) challenges the terms of contact with science.

McGoey (2012) also emphasizes the strategic use of ignorance by experts – but in her work they identify gaps in their own knowledge. Regulators, physicians and manufacturers may deflect responsibility for risks associated with medical drugs by failing to do or to recognize relevant research, 'seek[ing] to preserve ignorance rather than dispel it' (p554). Though both may be associated with requests for more resources, such 'strategic ignorance' may be contrasted with Merton's (1987) 'specified ignorance' which explicitly serves as a basis for new scientific work. Indeed 'strategic ignorance' often includes an active claim 'that to think further into a certain direction will be unimportant' or even dangerous (Gross 2007, p749) – what Knorr Cetina (1999) calls 'negative knowledge' (Knorr Cetina 1999). More recently Scott (2017) suggests that sociology pursue further analysis of such moments where social action is oriented around things not done or not examined.

Though a range of different terms have now been proposed to understand different forms of the 'unknown' (Gross 2007) or undone (Scott 2017), this paper will mainly discuss 'ignorance' and the more narrow 'negative knowledge'. An analysis of public health campaigns on AMR focusses attention on the social use and sociological interest of claims to both ignorance and negative knowledge. It also offers an opportunity to revisit questions about which forms of expertise inform public health attempts to know and intervene. Rather than emphasise the novelty and appeal of approaches using psychology or behavioural economics, I explore how they gain traction as other approaches seem to fail. Drawing attention to the evaluation work of public health, as well as its interventions, I show how it comes to identify ignorance in the public, and acknowledge its own apparent lack of understanding of people's action, especially any connection between information about AMR and antibiotic use or non-use.

Approaching AMR as a case study

Where a broader narrative about the evolution of liberal governmentality shapes many Foucauldian accounts, STS scholars are more likely to produce situated accounts of publics created around particular issues (Marres and Lezaun 2011). This paper also focusses on a specific case – efforts to engage ordinary people with antibiotic stewardship – taking this back to questions about the kinds of expertise that inform efforts at behaviour change in contemporary public health practice. Sources thus include the interventions themselves and documents produced by experts designing and evaluating these.

The table below lists all major initiatives addressing the public with messages promoting responsible antibiotic use in the UK in the last 20 years. To identify them, I undertook searches in the public health literature, and checked the results against ‘toolkits’ and sets of resources recommended by the Royal College of General Practice in the UK, Public Health England and the European Center for Disease Prevention and Control. I carried out further Web of Science and Google searches using the names of the initiatives to explore their antecedents (in papers documenting design or preliminary research), implementation and evaluation. Initiatives themselves were diverse: including posters and videos representing classic information campaigns, leaflets designed for use in clinics, and online learning materials for use in schools. They drew on and were evaluated through surveys, measures of ‘reach’, focus groups, interviews and randomized controlled trials. A Behavioural Insights / Department of Health report that attempted to summarise and influence the field in 2015 is described separately. References to and from all these sources were also followed up to explore the expert literatures used to support them, including marketing, psychology, economics and sociology. These texts were gathered together to create a database of more than 150 discrete sources. Attending to different knowledges that shape the field in this way helps illustrate scope for what Pykett (2015) identifies as contestation between kinds of expertise.

TABLE: Public engagement initiatives and key publications on AMR in the UK (includes cross-European campaigns)

Engagement initiative or publication	Design	Evaluation	Key references
1999-2007 <i>Andybotics</i> poster and leaflet campaign	Designed within Department of Health.	Evaluation through Office for National Statistics survey 2003, with sample of 7000 UK adults.	McNulty et al 2007

2007 <i>When should I worry</i> leaflet	Designed and evaluated by Cardiff academic group.	Evaluated through randomized controlled trial.	Hawking et al 2007 Francis et al 2009
2008-10 EU campaigns <i>Take Care Not Antibiotics</i> posters, leaflets and videos	Commissioned by EU European Centre for Disease Prevention and Control.	Evaluated through Euromonitor survey 2010.	McNulty et al 2008 Earnshaw et al 2009
<i>EBug</i> digital resources for schools and work with young people	Design of games and online information materials funded by British Society for Antimicrobial Chemotherapy, with UCL.	Surveys of those exposed to these materials.	Farrell et al 2011
2010-2016 <i>Caring for Coughs</i> leaflets, animation and website.	Based on NIHR funded research at Southampton and EU GRACE network.		Yardley et al 2013 Tonkin Crine et al 2014
2012-2014 EU campaigns <i>You wouldn't expect... Do not self medicate.</i>	Commissioned by EU European Centre for Disease Prevention and Control.	Evaluated through Euromonitor survey.	EC 2013
2015 <i>Behavioural Insights Report</i>	Review research funded by Department of Health (DoH) and Public Health England, UK government		DoH/PHE 2015
2014- <i>Antibiotic Guardian Campaign</i> (website, social media campaign)	Designed by team with Department of Health, with funding from British Society for Antimicrobial Chemotherapy	Evaluated through reach statistics, phone interviews and survey.	Bhattacharya et al 2016 Kesten et al 2016
2014 EU campaign <i>40% Europeans</i>	Commissioned by EU European Centre for Disease Prevention and Control.	Evaluated through Euromonitor survey.	EC 2016

I analysed the materials using discourse analysis methods common across Foucauldian and some STS scholarship, attending to the materiality of texts as well as the images and statements contained within them. Such analysis draws on linguistics to consider the ways words and images are used to produce particular effects, for example metaphor,

synecdoche or metonymy, as well as the underlying structures of a text, its explicit and implicit statements, absences or omissions (for examples and discussion see Law 2004). Law's (2009) work shows how this kind of discourse analysis can be applied in examination of textual devices within the STS tradition, using a set of European surveys on animal welfare to argue that this methodology itself 'makes' publics. In AMR similar surveys were used to evaluate and inform European campaigns. I therefore looked in detail at the framing of particular questions on these surveys, and the questions asked in trials and qualitative studies used to evaluate different public health interventions, as well as the ways in which reports on such research framed their aims, formal outcomes and findings, and the language used to describe participants and models of social action or behaviour.

In the next three sections I provide more detailed narrative of public health work in AMR and demonstrate how the field increasingly identified a recalcitrant public, making detailed reference to many of the interventions identified in the table above. Though some efforts were made to explore lay perspectives, experts continually returned to narrow versions of the problem of and solution for AMR. At the same time, they moved from an approach grounded in conveying information or knowledge, to appeals to emotional and non-reflective thinking of different kinds.

Government campaigns: knowledge, attitudes, action?

In this section I introduce two campaigns sponsored by the UK Department of Health to give the public information about the need to reduce unnecessary antibiotic use. Materials

from the UK only campaign from the late 1990s are contrasted with a Europe-wide campaign begun in 2008, using documents reporting on their design and evaluation over more than a decade.

In 1999 the Andybiotic character was introduced in posters, leaflets and media advertisements (Woodhead et al 2007). The campaign focused on reducing use of antibiotics for colds, coughs, sore throats and 'flu'. Drawing on the style of public information campaigns in the 1940s, Andybiotic implored 'don't wear me out' (Figure 1), appealing to the need to preserve a shared resource. The campaign used a question and answer format, with an anonymous expert voice offering answers to questions ostensibly coming from a patient or mother. Leaflets and posters were circulated again in 2000, 2002, 2003 and 2006 (Woodhead et al 2007).

Figures 1-4.

The campaign's effectiveness was assessed with data from the 2003 Omnibus survey of approximately 7000 UK adults (McNulty 2007), which evaluated people's 'knowledge' after presumed exposure to the campaign. This was measured through correct responses to 11 statements covering antibiotic action, the presence and viability of 'good bacteria' in the human body and the concept of resistance and its relevance. Those with least education had less knowledge on average, but limited knowledge was also identified as a characteristic of respondents aged 16-24 years or over 75. It was suggested that future campaigns might target these groups, however there were some problems with this

approach. Better knowledge was not associated with being less likely to have been prescribed antibiotics in the previous 12 months and was linked with at least some undesirable action from a public health perspective.

Knowledge of and attitude to antibiotics was associated with being more likely to finish a course of antibiotics as prescribed, but was also associated with being more likely to take antibiotics without being told to do so, and with being more likely to obtain antibiotics in another country without a prescription. (McNulty 2007 p734)

The authors concluded that increasing knowledge ‘may actually be counterproductive’ and increase self-medication. They called for a shift in approach ‘to understand the values and motivation that support self-medication and use these to encourage healthier options’ (McNulty 2007 p735) – a non-informational approach. It was hoped that ‘social marketing’ would help relate to the target audiences and their lives, creating simple messages around a well-defined behavioural outcome.

Social marketing principles are clear in the Europe-wide initiatives of the European Union’s Centre for Disease Prevention and Control (DH 2008). These focused again on ‘overuse’ of antibiotics for colds or flu but had more positive messages about things people could do to look after themselves without seeking medical help. Using cartoons in posters and short videos, the campaign presented a hedgehog mascot shown wrapping up warmly and enjoying hot drinks in a comfortable chair (Figure 2). Other posters continued the bright visual feel showing antibiotics directly with simple positive and negative messages, e.g. ‘Get

well soon without antibiotics' (Figure 3) or 'Unfortunately no amount of antibiotics will get rid of your cold' (Figure 4). Where the Andybiotics leaflet referenced doctors explicitly, the prescriber appeared here only through synecdoche in a logo showing a stethoscope wrapped protectively around an antibiotic capsule. A second set of posters were developed in 2012 with photographs of everyday objects (sun cream, computers) above light-hearted messages about the small chance that these would help cure colds or flu. The EU materials were sent out every November between 2008 and 2013, though not used in the UK in 2009 amidst fears that they would clash with a flu vaccination campaign. In addition to their informational content an emphasis on 'care' for the self was intended to counter desire for antibiotics with a positive message.

Surveys were again used for evaluation, exploring recall of the campaigns, knowledge and behaviour (eg EC Health 2010) – there was no sign yet of a switch to explore values or motivation in any detail. Knowledge was distilled to just 4 statements, about the lack of antibiotic efficacy against viruses, lack of efficacy against colds and flu (as caused by viruses), risk of future resistance and side effects. Only about a fifth of all respondents answered all four statements correctly, and 41% apparently did not know antibiotics were ineffective against colds and flu in 2009, though this was the main message of the campaigns. A second survey in 2013 found some improvement in awareness and knowledge but reported that people who had more knowledge still took antibiotics 'unnecessarily' – as in the UK Omnibus 2003 survey. 'This runs counter to the expectations that levels of antibiotics use should be lower among those Europeans who had received information about misuse,' (EC Health 2013, p10).

It seemed difficult to increase public knowledge defined as recall of the correct answers to propositional statements. Furthermore increasing this cognitive factor did not necessarily reduce the problematic behaviour (asking for antibiotics) and could lead to unintended consequences (retention and reuse). Though another initiative was launched using digital materials to reach younger people with a slightly more complex set of messages about viral and bacterial infections and the behaviour of microbes this remained focused on conveying information in schools.^{iv} However an alternative was emerging, citing qualitative studies as part of efforts to reexamine assumptions about the relationship between antibiotic ‘knowledge, attitudes and behaviour’ in the general population.

Engaging emotional subjects in a clinical frame

The next intervention, its design and evaluation all have a much more clinical flavour than those described above. Leaflets for parents consulting doctors about common infections were informed by research in the late 1990s on antibiotic prescribing practices and lay people’s attitudes to bacterial resistance, which were conceptualized as including affective as well as cognitive and behavioural elements. It was suggested that focus groups ‘related treatment failure to the body’s response to repeated antibiotic use and not to changes in resistance characteristics of bacterial populations’ (Hawkings et al 2007 p1157). The body could become ‘used to’ antibiotics, reducing their effectiveness. The authors noted that respondents’ ‘explanations were generally incongruent with prevailing biomedical concepts’, but suggested that while you could increase knowledge, ‘behavioural change is unlikely unless people have a clear sense of the importance of the change, value it and

believe that they can make feasible, positive contributions' (p1159). Another report noted that though some 'misuse' of antibiotics such as failing to take the full course was due to other pressures or constraints, some resulted from people's belief that 'their own bodies became used to them or because antibiotics are "unnatural"' (Hawkings et al 2008, p.152).

Members of this Cardiff-based group contributed to the design of a leaflet, encouraging parents of children with upper respiratory tract infections to manage without antibiotics.

The leaflet – **When should I worry** – was to be handed out to parents consulting a general practitioner to facilitate conversations about the limited effectiveness of antibiotics. It also informed people:

Using antibiotics can make bacteria **resistant** to antibiotics. In other words, the antibiotics will no longer work against the bacteria. Someone who has recently had antibiotics is more likely to have resistant bacteria in their body. Some bacteria have become resistant to almost all antibiotics!

Most antibiotics have side effects, e.g. diarrhoea, rashes and stomach upset.

Antibiotics kill our natural bacteria that help to protect us. This can result in infections such as thrush.

Antibiotics can also cause allergic reactions. These are often just annoying rashes, but can, in some cases, be severe reactions.

(When Should I Worry, p6, emphasis in original)

The language of the leaflet made resistance a problem for anyone who had had antibiotics 'recently' – increasing the salience of AMR. Building on the finding that people already

thought too much medicine is a bad thing the text emphasized side effects and allergic reactions, as well as the effects of antibiotics on 'natural bacteria' within people's own bodies and on the bacteria causing infections. Together such statements sought to anchor the message to avoid antibiotics wherever possible.

The leaflet also sought to address the emotional context for the clinical consultation. On the cover of the leaflet (**Figure 5**) the doctor's stethoscope was pictured as a plaything for the child, whose serious expression and apparent vulnerability nevertheless acknowledged the anxiety that might attend childhood illness. The text inside the leaflet gave information on symptoms that were normal and symptoms that signaled something more serious, not simply as instructions, but to bring about a different psychological state, arguing that improving parents' understanding of illness would help them feel in control (Francis et al 2008a). The designers cited Social Cognitive Theory and the Theory of Planned Behaviour, to support the claim that people do not simply act on information but respond according to their emotions, desires, confidence and skills (Francis et al 2008b). In line with this a randomized controlled trial of the leaflet's use had 'outcomes' that included not only antibiotic prescribing and consumption (professional and patient behaviour) but also 'parental satisfaction, reassurance and enablement' (Francis et al 2008b, Francis et al 2009) though the primary outcome was consultation rates, suggesting a focus on general practice workload as a possible effect of reducing antibiotic prescribing. The evaluation thus set aside 'knowledge' as a direct outcome.

Figure 5.

The use of controlled trial methodology positioned the leaflet as a clinical intervention, subject to similar evaluation as pharmaceuticals. The cluster randomized (but non-blinded) trial enrolled 61 practices, which recorded consultations with 558 families, some with the leaflet and some without. 'No [statistically significant] differences were recorded in terms of satisfaction, reassurance, value of information received, or parental enablement,' (Francis et al 2009 p6) so its effects on parents were a little unclear. However, they were able to report a reduction in prescribing when the leaflet was used, and thus judge the intervention a success. A similar approach was subsequently adapted in a leaflet for adults on 'Caring for Coughs' (Yardley et al 2013).

These findings influenced discussion in a Department of Health report published in 2015 that sought to reorient activity to reducing primary care prescribing by harnessing 'automatic psychological processes'. The report asserted the repeated findings of 'misconceptions' among the public and bemoaned the difficulty of creating awareness of the 'social' threat of AMR and a tendency to blame others, especially those thought to overuse antibiotics (Department of Health 2015 p27). Comparing the two approaches discussed so far it was argued that while media campaigns were more effective at 'disseminating information', 'medical professionals are more effective at actually changing behaviours' (p6). The authors suggested that experts could attempt to develop 'the correct conceptual framework' for the public to realise they could contribute and take 'responsibility for safeguarding antibiotic effectively' (p28).

However a counter-argument runs that the scientific basis of resistance may over-complicate an already complex picture. *The intuitive belief that too much of something leads to problems, may in fact be sufficient in influencing the public to reduce their consumption.* Re-directing understanding such that individual benefit is offset by societal loss (rather than individual loss) may not be helpful in changing behaviour. (p28, emphasis added)

This text suggested that expert knowledge might ‘over-complicate’. Lay beliefs in the risks of excessive medicine taking might be ‘sufficient’ as an anchor for behaviour change, avoiding the need for a cognitive shift from a focus on individual to collective risks and benefits. Such a move could also be presented as a pragmatic recognition of the material and social pressures on people.

In an ideal world the outcome of a successful public behaviour change initiative might be that patients consider future antibiotic resistance when deciding how to manage their illness and what management plan they deem appropriate. Such a situation may be unrealistic for the majority of patients faced with more concrete and imminent hurdles such as whether they can bear the financial cost of illness.

Therefore, changes to the environment that prompt positive antibiotic behaviours without the need for reflective mental processing may be an appropriate way to support change. (p48, emphasis in original)

The report showed how a commitment to nudge and its emphasis on automatic thinking might be accompanied by a shrug, moving away from information and encouraging ‘lay’

beliefs that were helpful if thought to be mildly inaccurate. The authors said that confusions between bacteria and viruses were still common, and expert 'understanding of resistance... runs contrary to the public's intuition... [but] whether it is necessary for people to understand antibiotic resistance (as opposed to merely accepting it) is unclear' (p48). Even so without some understanding they thought it unlikely that a 'new social norm' to minimize use could be established. This interest in 'social norms' shapes two further interventions that are the subject of the third and final findings section.

Shaping social norms and creating cognitive and social distinctions

Campaigns that harness the power of social norms or herd mentality to influence behaviour look rather different from those described in the first two sections. The first example here is a social media campaign launched by Public Health England (PHE) in 2014 asking people to pledge to reduce antibiotic use. This was designed to work through a social norm for actions to be consistent with personal commitments. The second is a set of EU posters that ask people to align with the well-informed but small majority in resisting the use of antibiotics for colds and flu.

The pledge was offered as a way to involve people with AMR and make a connection between antibiotic resistance and everyday actions. Rather than an individual moving from knowledge or emotion to action, the pledge was thought to increase the chance that an intention was followed in a fundamentally divided subject. This is associated with the

Theory of Planned Behaviour in psychology, but here was also linked to the work of Gollwitzer (1999) on 'implementation intentions' working through the social norm for consistency – and other research suggesting that if people stated a specific intention there was an 'automatic trigger' for fulfilling it. This theory was not elaborated in the Behavioural Insights report, though the report did mention pledges, but it shows how nudge built on psychological theories about automatic thinking and a possible temporal separation between reflective and automatic thinking in a single social actor.

The intention-behaviour gap describes a situation in which an individual is committed to a goal but does not achieve it. It has been suggested that this gap can be addressed by supporting people to translate goal intentions into behavioural action in an "if-then" format [13]. For example, one of the campaign's pledges is "For infections that our bodies are good at fighting off on their own, like coughs, colds, sore throats and flu, I pledge to try treating the symptoms for five days rather than going to the GP" ... Setting implementation intentions increase the likelihood of goal attainment by supporting the automatic trigger of certain actions in pre-determined situations. (Kesten et al 2018 p2).

A further idea was that a commitment would work best when made in public. Sharing the pledge with links on social media would fulfil this condition, create a larger audience for the campaign and encourage others to join. The Antibiotic Guardian website presented resistance as both a social problem *and* a potential threat to the individual if they were to have need of medical interventions such as operations and chemotherapy in the future. Different pledges were offered to different groups. In the 'Public' category, 'Adults' or

'Families' were asked to choose a pledge from consulting pharmacists rather than doctors about colds or flu; accepting flu vaccinations; returning unused antibiotics; using antibiotics as prescribed; or teaching children to wash their hands. Other appeals were made to groups using antibiotics in their work such as vets, farmers and health care practitioners.^v

The campaign was evaluated through measures of its 'reach', a survey and a small telephone interview study (Chaintarli et al 2016, Kesten et al 2018). In the survey only about half the respondents said they were able to remember their pledge and just under half reported gaining knowledge. The interview study noted that the pledge often matched previous behaviour and had been 'a continuation of their current thinking' (Kesten et al 2018). In the discussion, the authors suggested that respondents might be imagined as 'early adopters', and that 'recruiting popular and influential AGs [Antibiotic Guardians] may provide a mechanism for engaging those with less knowledge about AMR' (Kesten et al 2018). So 'engagement' could again happen in the absence of knowledge, by encouraging the development of beliefs about social norms for antibiotic stewardship. Initially such norms were spread in the relatively small publics created by social media contacts of the 'early adopters', but could be taken as signals about broader collective commitments. One respondent in the evaluation said:

I'd love to do something about it, but it's really hard when you're just one person [laughs]. So signing up to campaigns like this sort of does make you think, right, okay, well it's sort of demonstrating that the general public does actually care about these things. (Kersten et al 2018).

Professionals and lay people claimed they now 'felt part of a wider community of people working to keep antibiotics active' (Chaintarli et al 2016, p3). Making the statement offered those who were concerned about AMR a concrete action and a new identity as 'Antibiotic Guardians'. The evaluators noted limits to the reach of the initial campaign - more than two thirds of those signed up were health professionals (Bhattacharya et al 2017, and Figure 6) - yet the approach was repeated and adopted by the ECDC in its #KeepAntibioticsWorking campaign launched in November 2017.

A final set of posters for the EU Antibiotic Awareness Day campaigns reveals the potential use of 'social norms' in another guise. Posters added in 2014 (Figure 7) once again targeted unnecessary use of antibiotics against colds and flu, without a prescription. Instead of trying to create a norm for conservation of antibiotics, data from the 2013 Eurobarometer was used to make a statement about the ignorance of the large minority of Europeans who 'believe that antibiotics work against cold or flu'.

Figures 6 and 7.

The posters invited readers to believe themselves superior to this ignorant group, aligning with the 59% who understood antibiotic ineffectiveness. Medical experts were referenced directly in the posters, which suggested that people ask a doctor for advice or 'other medicines', reinstating the prescriber as a key actor.

Ignorance, the recalcitrant public and its consequences

This paper constructs a brief history of public health efforts to reduce ordinary antibiotic use and mitigate antimicrobial resistance in the UK, identifying lay and expert 'ignorance' discovered in the process. In this discussion I summarise how such ignorance first appears as a problem, and then becomes productive in different ways as public health confronts a public that appears relatively non-responsive and reluctant to change. Firstly, identifying expert *and* lay ignorance is used as a warrant for appealing to non-reflective or automatic thinking rather than providing more information. Though this is true in other areas of public health, AMR is perhaps unusual in seeing fairly explicit discussion of the risk that knowledge leads to undesirable action. Secondly, lay 'misunderstandings' are re-purposed, becoming material for campaigns that amplify existing ideas about antibiotics and their effects, rather than trying to correct them. Thirdly, expert accounts of public ignorance are used to invite people to join a small more knowledgeable majority. These examples not only help explain shifts to emotional and behavioural approaches to governing, but also offer further elaborations of the sociological importance of ignorance and other negative social phenomena (Scott 2017).

The antibiotic stewardship campaigns framed in the UK and across Europe between 1999 and 2008 created a problem for public health workers tasked with reducing unnecessary antibiotic use. Evaluations showed that many people continued to profess relative ignorance of key facts about illness and antibiotic action. Even worse, those that did have some knowledge did not act in the ways that had been predicted, apparently engaging in

more unsanctioned antibiotic use. In this paper I do not seek to explore why people might have been providing such answers, or explore lay knowledge with other methods. Instead, I address the effects of these troubling failures for public health, exploring how they opened up new possibilities for research and intervention, and closed down others.

My main argument is that both expert and lay ignorance were mobilized in the shift to approaches appealing to non-reflective thinking. Assertions of ignorance among lay people are perhaps less studied in sociology than the more unusual and surprising claims to expert ignorance but here we have both. Lay ignorance was identified by experts, in the inability to respond correctly to narrow propositions about the material world (Wynne 1987) rather than broader lack of involvement or experience (c.f. Lezaun and Soneryd 2007). Expert ignorance appeared as one outcome of this observation, as public health specialists confronted their frequent failure to transmit such propositional knowledge *and* the troubling observation that those people who did reproduce appropriate knowledge in surveys did not then act as expected. In thinking about this second group we have the first example of 'negative knowledge' (Knorr Cetina 1999) or knowledge that is dangerous to pursue. While the experience of recalcitrant publics is surely not unusual in public health, the identification of unintended and undesirable consequences of increased knowledge appears particularly clear in the case of AMR.

The expert ignorance identified in this case does not initially seem to be used strategically as described in McGoey (2012). Though there were some calls for further research on lay beliefs and values (see also Merton 1987 on the function of should specified ignorance in science), it was increasingly claimed that not much research might be required, if

behavioural economics could identify interventions that used automatic thinking using existing data. Expert ignorance was not here used to deny liability, but rather to signal this shift from information to emotion and automatic thinking in campaigns aimed at the non-reflective citizen (Jones et al 2013). However I argue that this shift can be explained not only through the appeal of ‘nudge’ but also the move that precedes or accompanies it, when public health workers feel increasingly unable to affect or predict what people know and think. Acknowledging the risks of applying simple words to different and potentially complex actions, I suggest this move might be provocatively described as ‘a shrug’ – a strategic retreat from engagement – to accompany the nudge. The term shrug is not meant to imply indifference,^{vi} but to describe a negative action (Scott 2017). This occurred when it seemed too difficult to talk to people about the likely mechanisms of AMR, to relate to the complexity of people’s experience of infections, or to discuss collective stakes in the spread of resistance. Prior to the nudge then, and perhaps more important, a shrug represents the move to let people think what they will.

This shrug is arguably more prominent in the Behavioural Insights report (2015) than any coherent account of a nudge approach to AMR. The report did not provide many new ideas, but collected and offered some conceptual support for approaches already grounded in psychology and even sociology. Yet it did contain statements about a second use of ignorance, suggesting experts might build on what they otherwise understand as ‘misunderstandings’ rather than attempting to elaborate correct conceptual frameworks for AMR. The authors proposed attaching antibiotic stewardship messages to existing ideas about antibiotics and the body, such as beliefs about the effects of antibiotics on ‘natural bacteria,’ in order to trigger non-reflective suspicion of (non-natural) medicines that in

other circumstances they might resist (e.g. vaccination). A shift from presenting resistance as a quality of bacteria led to accounts of it as lingering in human bodies, coming closer to the notion of the body 'building up' resistance. Qualitative research with lay people thus offered not a means of public involvement (Michael 1996) but a source of themes to be amplified in expert-led interventions, especially those aimed at parents of young children.

More explicit differentiation between lay people was made possible through a third use of ignorance, where ignorance was associated with only part of the public. One version of this used the Euromonitor survey results to invite Europeans to enjoy a sense of superiority by distancing themselves from others' naïve belief in antibiotics' value against viral infections. This kind of 'associational distancing' is commonly discussed in sociological accounts of identity work (e.g. Snow and Anderson 1987). In this case experts attempted to provoke it as a public health approach asserting distance between different members of the public rather than between experts and lay people (c.f. Maranta et al 2003; Michael 2012). Such appeals are more subtly invoked in the ongoing UK Antibiotic Guardian campaigns where it is suggested that 'early adopters' who have engaged reflectively with the issue of antibiotic resistance may be imitated by followers acting more automatically. Though little theorized, this could be parsed as a version of 'herd mentality' in nudge or of sociological accounts of the diffusion of innovation (Rogers 1962). Yet critically the Antibiotic Guardian campaign relies on two kinds of distinction at the same time: the psychological distinction between two types of thinking used at different times by a single person, and a social distinction drawn between different types of people by their thinking habits. Though nudge admits to being a form of paternalism (Rebonato 2014), this ability to create social distinctions among those governed or addressed by government is perhaps less obvious.

The three different uses of ignorance described here – and the expert claims on which they are grounded – are not always clearly defined or distinguished from each other. Public health continues to draw on different conceptual models and research methodologies in working on antibiotic stewardship. Nevertheless, such uses of ignorance do seem to reduce the space for other kinds of public engagement around AMR. For example, there appears limited interest in bringing together expert and lay perspectives in deliberative events (c.f. Marenta 2003, Lezaun and Soneryd 2007). There is also little discussion of those people who demonstrate knowledge and take independent decisions to use antibiotics, who are figured as problematic antibiotic consumers rather than responsive and reflective citizens with whom to engage. My analysis thus provides an empirical illustration of how nudge reduces opportunities for more democratic discussion (e.g. Carter 2015, Leggett 2014), or for work to generate meaningful ‘publics’ around the issue (e.g. Marres and Lezaun 2011). Choosing to emphasise the common cold or flu also creates a division between public health messages and media and policy talk of apocalypse (Brown and Crawford 2009, Nerlich 2009, Brown and Nettleton 2017), as well as tensions with efforts to depict flu as serious. Though the 1990s Antibiotic campaigns used a particular style to invoke the national crisis of the 1940s and the need for solidarity in conserving scarce resources, more recent campaigns largely address people as individuals concerned about their own health (or that of their families) and their reputation or sense of self.

In conclusion, efforts to trigger non-reflective thinking show how behavioural economics can gain traction from the travails of public health, offering an alternative ‘economic imaginary’ to that described by Brown and Nettleton (2017). Though AMR may offer an

example of wider trends in public health, it shows a very explicit loss in confidence in citizens' capacities for reflection. The analysis of this case suggests that experts may be increasingly ready to work with distinctions not only between different types of thinking but also different possible publics, who are discursively constituted as negative subjects imagined as ignorant, irrational or rebellious. 'Ignorance' therefore is not only strategic but productive, reducing space for more explicit political encounters with AMR and bringing a tendency to draw divisions between citizens, as well as between lay people and those experts advising government.

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ⁱ See Cohn (2014) for a sociological critique of health behavior in public health. The language of ‘behaviour’ informs the framing of funding, such as the ESRC call (2016) ‘Tackling antimicrobial resistance: behaviour within and beyond the healthcare setting’.

ⁱⁱ Jones et al (2013) point out that Foucault identified an interest in non-rational choices in Chicago neoliberal theory in the 1970s, and argue that these ideas can be seen in UK policy from the late 1990s and seem to be growing in influence. Thus where Jones et al (2013) describe a liberalism that imagines citizens through a psychoanalytic lens as subject to anxiety, Pykett (2015) suggests that ‘neoliberal citizens’ are increasingly imagined as ‘vulnerable to cognitive bias [and] mental shortcuts’ through references to behavioural economics and neuroscience. There is however no simple shift from one to the other. Pykett (2015) in particular emphasises Foucault’s interest in ongoing contradictions and tensions between practices (p75), making space to explore appeals to different emotions or non-rational behaviours.

ⁱⁱⁱ Others emphasise the implications for the state, for example Leggett (2014) suggests that policy applications of nudge reduce the ability of a social democratic government to claim a distinct mandate for legislation and so-called ‘shove’ strategies, and the state’s ability to distance itself from commercial actors who more commonly work through persuasion.

^{iv} The EBug initiative was aimed at children aged 9-11 and 13-15 years through educational settings where an information approach appeared less problematic than in these campaigns.

^v ‘Farmers’ and ‘Pet owners’ were both asked to keep animals healthy without antibiotics where possible; and work with vets to reduce antibiotic use.

^{vi} Though feelings of indifference, frustration and confusion might accompany the shrug as a negative action.