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Pharmaceuticals and society: Power, Promises and Prospects

Special Issue for Social Science and Medicine

Jonathan Gabe, Simon Williams, Paul Martin and Catherine Coveney (guest editors)

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Introduction

This special issue stems from a symposium organised by the authors at the University of Warwick, UK, in December 2011. The event brought together a range of researchers in medical sociology, Science and Technology Studies (STS) and cognate fields in order to take stock and critically examine, from a variety of different perspectives, the role of pharmaceuticals in society. More specifically, the aim was to consider the empirical and theoretical questions arising from recent trends in the development, regulation, marketing and use of pharmaceutical products.

Our starting point was a recognition that remarkably little sociological attention had been given to pharmaceuticals until recently. Early work was undertaken by only a few scholars and focused on particular types of medications such as minor tranquillisers (Cooperstock and Lennard 1979; Helman 1981; Gabe 1990, 1991; Gabe and Lipshitz Phillips 1982, 1984) or specific drugs such as Opren or Halcion (e.g. Abraham 1995; Abraham and Sheppard 1999; Gabe and Bury 1996). Occasionally the analysis within these studies was linked to wider social processes and sociological questions such as medicalization and social control (Koumjian 1981; Gabe and Lipshitz Phillips 1984). Key contributors to the medicalization debate, nevertheless, tended to pay little attention to pharmaceuticals per se (e.g. Conrad and Schneider 1992).

Times have changed since the millennium, however. Conrad (2007), for example, in his book *The Medicalization of Society* now recognises that pharmaceutical companies have become so important that they have displaced physicians as a main driver of the medicalization process. While Conrad believes that medicalization can incorporate such developments, others have argued that a new concept, pharmaceuticalization, is needed to capture the growing importance of pharmaceuticals as a specific form of medicine, within and beyond medicalization. This term was, to our knowledge, first introduced in anthropology by Nichter (1989, cited in Bell and Figert 2012) and in sociology by Abraham (2007). In the last few years nevertheless its contours and meaning has been increasingly discussed and debated. According to Williams et al (2011a:711), for example, pharmaceuticalization involves ‘the transformation of human conditions, capabilities and capacities into opportunities for pharmaceutical intervention’. Abraham (2010: 604), however, argues that it is a ‘process by which social, behavioural, or bodily conditions are treated or deemed to be in need of

treatment, with medical drugs by doctors or patients'. One of the key points of difference between these definitions, therefore, is that the former is broader in that it recognises the role of pharmacological interventions for *non medical* as well as medical reasons (Williams et al 2011b). In other words Williams et al are suggesting that we should not just restrict ourselves to the use of pharmaceuticals by doctors or patients for treatment purposes but should also consider their use outside the realm of medical authority for lifestyle or enhancement reasons. This use of medicines for 'enhancement' in turn illustrates how one can have pharmaceuticalization without any significant degree of medicalization.

In addition, Williams et al (2011a) suggest that pharmaceuticalization is a dynamic socio-technical process that is part of a 'pharmaceutical regime'. That is to say it can be understood as a network of institutions, organisations, actors and artefacts, alongside those cognitive structures and affective processes associated with the creation, production and use of therapeutics. It is the intention to explore this pharmaceutical regime in this special issue, taking account of both upstream level processes concerning the development, testing and regulation of pharmaceuticals and downstream level processes concerning the meaning and use of pharmaceuticals in medical practice and in everyday life.

The 'pharmaceuticalization' of society has proceeded apace in recent decades as markets for pharmaceuticals have expanded, new medical conditions have been identified for treatment and new drugs have been produced for new markets. While physicians remain the gatekeepers for many drugs, pharmaceutical companies are increasingly targeting members of the public alongside physicians in various direct and indirect ways. As a result, the reliance on and use of medicines has increased in some areas, thereby fuelling further debates not simply about expanding markets, but also about the 'appropriate/inappropriate' use of medicines, including both 'over' and 'under' use.

Consideration, at one and the same time, has also been given to the regulation of medicines (Abraham and Lewis 2000; Davis and Abraham 2012) and the policy issues raised (Davis 1997). More recently there have been attempts to develop a sociological analysis of the relationship between the macro level of the pharmaceutical industry and health care systems and the micro level of doctor patient relations (Britten 2008), the reasons for 'expanding markets' and 'excessive use' (Busfield 2010) and the risks involved in prescribed medicines (Light 2010).

As Bell and Figert (2012:776) note, pharmaceuticalization also ‘maps onto global patterns of wealth and poverty, and of power and inequality’. When considering the processes and politics of drug development, marketing and consumption, one might argue that the pharmaceutical industry is often Western centric in its efforts and intentions (see Fisher et al, this issue). However, while most sociological attention has been directed towards pharmaceuticalization in the West, anthropologists have focused on this process in low or middle-income countries where political and economic systems are typically post-colonial (Petryna, et al 2006) . One particular focus here has been on how public health in these countries has been pharmaceuticalized, by linking the right to health with the right to treatment with pharmaceuticals, such as free anti-retrovirals for HIV/AIDS in Brazil (Biehl 2004, cited in Bell and Figert 2012). Another example is the World Trade Organisation’s Trade Related property Rights (TRIPS) agreement, which has helped global pharmaceutical companies to undertake clinical trials in countries such as India (see Sariola et al, this issue). Such considerations are important to understanding pharmaceuticalization as a concept and its dynamics on a global scale (Cloatre and Pickersgill 2014).

While there is considerable evidence to support the claim that pharmaceuticalization is developing rapidly, it nevertheless needs to be acknowledged that: (i) pharmaceuticals play a vital role in the alleviation of human suffering and the extension of life itself; (ii) pharmaceuticalization, as such, is a descriptive, value neutral concept - unlike other recent terms such as ‘disease mongering’ (Moynihan 2002) which imply an in-built element of social critique - the costs and benefits, gains and losses of which need to be judged on a case-by-case basis; (iii) pharmaceuticalization can be a bi-directional process where de-pharmaceuticalization is also possible. Whilst none of the papers in this special issue, admittedly, address this last point about depharmaceuticalization, and whilst it is more likely in practice that a new generation of drugs will replace a previous generation rather than being phased out as an area of intervention altogether, the latter remains a possibility. So, of course, do various forms of social resistance to pharmaceuticals amongst lay people and or experts, alongside others advocating expansion of such uses in existing or new areas. Finally, we should also remember, of course, that pharmaceuticals constitute just one part, albeit a critical and contested part, of the contemporary therapeutic and enhancement landscapes that stretch before us in the twenty-first century. As such they co-exist and or compete with other forms medical care, self-management or optimisation.

As yet, however, no one has attempted to explore in a sustained way the broad process of pharmaceuticalization and its consequences for individuals and society. This special issue aims to do just that, drawing on medical sociology, STS and cognate disciplines. The special issue is divided into five themes which capture different dimensions of pharmaceuticalization: markets for medicines; regulatory agencies and the state; patients, consumers, lifestyles; from treatment to enhancement: the use of drugs for non-medical purposes; and pharmaceutical futures in the making.

1. Markets for Medicines

The first paper, by Joan Busfield, aims to contribute to understanding overtreatment by exploring the ways in which it is possible to identify when and to what extent medicines such as antibiotics, antidepressants and antihypertensives are overused, a topic which she argues has so far been given little attention by scholars interested in pharmaceuticalization. She considers the World Health Organisation's criteria for the 'rational' use of medicines, pointing to some of the issues they raise. She then develops a typology of over and under use derived from these criteria. This provides the basis for a framework for assessing overuse, paying particular attention to those medicines for which there is little evidence of effectiveness for the conditions for which they are being prescribed (e.g. antibiotics), and those where the issue of clinical need is in doubt (e.g. psychoactive drugs). Factors that encourage overuse, such as doctors' preference for risk avoidance leading to continuing prescribing for longer than is necessary and the activities of pharmaceutical companies in producing and reporting clinical trials that underpin their production, are also considered.

This theme of overuse is also picked up by Courtney Davis who explores the drivers and impacts of expanding pharmaceutical use in the treatment of patients with advanced, incurable cancer. While some of this growth can be seen as addressing previously unmet need, she suggests that a major part of it is due to 'inappropriate and overly aggressive' use of drugs. She acknowledges the role of physician and patient expectations in the use of these medicines but suggests that the pharmaceutical companies' control over the organisation and funding of research and its ability to shape the information landscape is a key factor. On this basis she argues that pharmaceuticalization should not just be restricted to cases involving a re-designation of a condition as suitable for pharmaceutical intervention with a new or existing drug, as implied in the literature (Abraham 2009, Williams et al 2011a). Rather it

should encompass any instance of medicines expansion in use, including the increasing application of existing drugs to meet the established need of an existing patient population.

In a rejoinder Abraham acknowledges that Davis has advanced pharmaceuticalization studies by showing systematically how poor quality industry-dominated information about cancer therapies can give rise to patient expectations that facilitate over-treatment. However he argues that Davis' argument fits with his analytic framework (2010) which recognises explicitly 'that pharmaceuticalization can grow without expansion of medicalization because some drugs are increasingly used to treat an established medical condition involving no transformation of a non-medical problem into a medical one' (Abraham 2010: 605). Davis responds to Abraham by rejecting his claim that she has misrepresented his work and goes on to make some wider points about whether an increase in drug innovations offering therapeutic advance can alone explain *overall* growth in medicines consumption, as she claims Abraham argues, even if he develops a more nuanced argument in relation to specific drug products and diseases.

The third paper in this section, by Pollock and Jones, offers a cautionary note about claims of excessive drug use and whether such pharmaceuticalization is a good or bad thing. They focus on coronary artery disease (CAD) in the United States and argue that claims about excessive drug treatment need to be placed in a therapeutic landscape involving four intersecting elements: pharmaceuticals, surgery, lifestyle change and inaction. Furthermore, treatment options need to be considered in terms of stratification as there may be over-treatment in some populations and under-treatment in others. For example, they argue that people at risk of CAD face a racialized terrain with unequal access to care. African Americans are less likely to be prescribed medication for CAD than their white counterparts and are also less likely to be given bypass surgery or angioplasty. Their paper illustrates how structural factors and health inequalities (including access to different therapeutic regimes) can act to shape patterns of pharmaceuticalization within and between different social groups. Whether such patterns of pharmaceuticalization can be interpreted as undertreatment/ overtreatment, appropriate or inappropriate and the consequences of this, is then context specific or case dependent. Pollock and Jones conclude that analyses of pharmaceuticalization must pay attention to the specificity of the particular pharmaceutical and the constraints surrounding its use, especially uneven access and alternative solutions.

In the last paper in this section Collin and Otero consider the role of media in marketing anxiety-depressive disorders to family doctors in Canada to promote their (over) prescribing of psychotropic drugs. They frame their study in terms of a pharmaceutical regime made up of networks of actors, institutions and artefacts together with the cognitive structures or socially and culturally accepted classifications that underlie the promotion and use of medications. They argue that their paper explores the linkages between different components of this pharmaceutical regime. Through an analysis of psychotropic advertising in Canadian medical journals between 1950 and 1990 they reveal that despite paradigm shifts in the classification of mental diseases and the development of psychopharmacology, the adverts reveal a remarkable continuity in emphasising the management of anxiety-depressive disorders in primary care through psychotropic medications. Such specificity in the promotion of new drugs may have been appealing to general practitioners when faced with the constant redefinition of diagnostic categories. Collin and Otero also argue that their historical analysis reveals the non-linear, dynamic process of pharmaceuticalization, as drug classes are continually displaced and substituted by others, with periods of ‘pharmacological enthusiasm’ overlapping periods of ‘pharmacological Calvinism’.

2. Regulatory agencies and the state

A second theme is the changing relationship between the regulatory agencies and the state as a dimension of pharmaceuticalization. Two issues are focused on in this special issue. First, there is the globalisation of established models of governance based on the interests of the pharmaceutical industry in the developed world (e.g. World Trade Organisation’s Trade related Intellectual Property Rights (TRIPS) agreement aimed to harmonise intellectual property rights and patent protection globally). Second are moves to reduce the regulatory hurdle in specific circumstances, such as when it is deemed necessary to champion innovative pharmacogenetics or when national security is said to be threatened.

Sariola et als’ paper focuses on the implications of TRIPS for the pharmaceutical industry in India which has seen a sharp increase in clinical trials from 2005, following the signing of this agreement. The Indian government, and some of the larger Indian pharmaceutical companies, thought that TRIPS would encourage the development of basic research while attracting international clinical trials. In practice such trials have increased hugely (at least until recently when regulatory conditions have been more strictly interpreted) while Indian

companies' success in bringing new chemical entities to market has been limited to date. The expansion of trial activity has involved local corporations and researchers, but it remains to be seen whether such involvement will lead to local knowledge production. For Sariola and colleagues the spread of pharmaceutical research globally and the increasing concentration of capital in India is illustrative of what they call 'big-pharmaceuticalization', with large international companies gaining increasing market share and using their power to rewrite local regulations in their own interest.

A second paper concerned with the globalisation of the governance of pharmaceutical companies focuses on the nature of ethical review of industry sponsored clinical trials across South Asia. Simpson et al draw on interviews with ethical review committee members from across India, Sri Lanka and Nepal to reveal the tensions faced between the pull towards harmonisation and a strong alignment with international standards and a responsibility to protect the interests of trial participants who may face poverty, illiteracy and structural inequality. The emphasis on standardisation is seen as endangering the independence of reviewers to set the scope of their concerns. According to Simpson et al, these tensions are not simply national, but fuelled by changes in the US and Europe to increase research capacity and speed up governance.

Next attention is shifted to the developed world and the actions of the leading regulatory agency, the US Food and Drug Administration (FDA) as a driver of pharmaceuticalization. Hogarth concentrates on the FDA's decision a decade or so ago to champion pharmacogenetics as an illustration of the shift in the role of the regulator from that of gate-keeper to enabler. He argues that the decision to speed up the regulatory process and be more flexible does not simply demonstrate the capture of the agency by the pharmaceutical industry but by a more diverse set of interests who are keen to promote US competitive interest in the bio-economy. This shift in the regulatory role is also closely related, according to Hogarth, to the trend towards a risk management approach to pharmaceutical regulation. Overall, these changes can be seen to represent an important move by the state to actively promote an innovation agenda that places the development of new pharmaceuticals at the heart of emerging knowledge economies.

Elbe et al's paper, in contrast, looks at the complex role that governments play in the evolving dynamics of pharmaceuticalization in society. Focusing on national security agendas, they argue that there has been a 'pharmaceutical turn' in national security policies

across the globe, driven by the threats posed to population health by acts of bioterrorism and pandemics. They document five ‘extraordinary’ policy interventions through which, they argue, governments are influencing the development, regulation, sale and consumption of pharmaceuticals designated as ‘medical countermeasures’ to these biological threats. These include financially incentivising the commercial development of new medical countermeasures, introducing bespoke regulatory pathways for the approval of these new medicines, establishing procedures to allow the use of unapproved medicines in emergency situations and establishing new mechanisms to enable their mass distribution.

Such measures, they argue, are quite exceptional, and involve governments operating well beyond conventional boundaries of pharmaceutical regulation. Not only are they facilitating the regulatory approval of novel pharmaceuticals, and use of unapproved medicines, they are also creating new routes for pharmaceutical consumption outside of the clinical sphere. As such, governments can be seen to be powerful drivers of pharmaceuticalization, influencing the pace, intensity and trajectory it takes.

3. Patients, consumers, lifestyles

In this section the focus moves from more macro level concerns to the role of patients or consumers in the pharmaceuticalization process. Consideration is given first to the social and symbolic meanings of medicines and their management in everyday life, before assessing how such meanings are related to and are informed by the development of users as information rich consumers. On the one hand the rise of the knowledgeable, reflexive actor may fuel demand for medicines, on the other it may encourage resistance to pharmaceuticalization. At the collective level particular attention is given to patient groups and their ability to counter balance the pro-pharmaceuticalization impact of groups seeking access to new medicines.

Dew et al explore the meaning of pharmaceuticalization in everyday life through an analysis of the stories of New Zealand householders about social practices related to medications. They build on research which has focused on the moral concerns of responsibility and discipline in medicines use, such as passive or active medications practices and adherence to orthodox or unorthodox accounts, and demonstrate how these dichotomies do not adequately capture how medications are understood and used in everyday life. Instead they found that

attitudes to medications change according to factors such as why they are taken, who is taking them, their impact on social relationships and views about what causes disease. Importantly they argue that pharmaceuticals are tied to identity, what we want to show of ourselves, what sort of person we want to be seen as and the kind of world we see ourselves living in. They suggest that pharmaceuticals represent forms of governance involving different sets of roles and responsibilities. How medicines are evaluated then depend on these roles and the responsibilities associated with them.

Will and Weiner also focus on identity but in relation to the use of one particular medication – statins to reduce blood cholesterol levels – which was licensed for sale over the pharmacy counter in the UK in 2004. They analyse professional and policy debates about this product as well as promotional and sales information and draw on interviews with consumers and potential consumers in order to identify the different consumer identities invoked. They found that policy makers constructed an image of the ‘citizen-consumer’ who would take responsibility for their heart health by choosing to purchase statins, while medical professionals expressed concern about ‘a flawed consumer’ who might misuse the drug. In comparison, those who used or might use statins constructed themselves as ‘health consumers’, purchasing a wide variety of products for heart health but also as being reluctant ‘pharmaceutical consumers’ who either preferred to take medication on a doctor’s advice or sought to minimise drug use. They characterise such people as ‘primed consumers’, who may wish to control aspects of their health following their own rationales, but to do so following professional advice. In contrast to researchers of pharmaceuticalization who have focused on consumers demanding access to new drugs (or less often seeking compensation for adverse effects), their study shows that there may not always be demand for new medications, especially if aimed at prevention or asymptomatic conditions.

While Dew et al and Will and Weiner have focused on the meaning of medicines to households or individual users Britten et al shift the emphasis to the more collective level of patient groups and embodied health movements. Their paper reports on a case study of a retrospective evaluation of a specific treatment for type two diabetes by an institutionally supported patient involvement group in the UK. The group was found to be critical of current licencing processes such as relying on unrepresentative trial populations, and used its own embodied experiences of medicine to evaluate expert knowledge. As such, they shared with embodied health movements the epistemic work of acting at the boundary of health research and the lived experience of patients. Their panel decisions were influenced by attempts to

balance benefits and harms of new drugs or by trust in experts. Consequently, they have the potential to balance the pro-pharmaceuticalization impact of groups seeking access to new medicines and to influence pharmaceutical governance.

4. From treatment to enhancement – the use of drugs for non-medical purposes

A further possible consequence of growing consumerism is the use of drugs for enhancement purposes among healthy people. Enhancement itself remains a contested term, not least because it is frequently employed to denote going beyond treatment or health to become ‘better than well’.

Vrecko focuses on the illicit exchange and non-medical use of stimulant drugs by US university students on one university campus to improve their academic performance – that is for enhancement beyond the norm. The term ‘drug diversion’ is employed to describe the movement of medications away from those to whom they have been prescribed legally, to those who obtain and use them illegally and for non-therapeutic purposes. Four different sources of drug-diverted medication are discussed – from friends, family, black market vendors and deceived clinicians. Which sources are used depends on how individual students think and feel about their non-medical drug usage. On this basis it is argued that prescription stimulant diversion is characterised by a significant degree of complexity and heterogeneity, a key point made by Williams et al (2011a) in their discussion of pharmaceuticalization. This is important in pointing to limits in the extent of non-medical enhancement use.

Morrison focuses on the processes of pharmaceuticalization and medicalization in configuring childhood short stature as a site for drug intervention with human Growth Hormone (hGH). His interest is in exploring how some applications of hGH in treating short stature have come to be accepted as legitimate therapies while others remain contested as ‘enhancements’ in the US and UK. Employing a comparative historical approach he finds that short stature was first medicalized and treated as abnormal as a result of public health concerns but that this did not in itself directly contribute to pharmaceuticalization of the condition. The latter required academic medical experimentation to discover a molecule which governed human growth without any direct involvement of the pharmaceutical industry. The industry’s subsequent development of drugs to treat short stature illustrates the confluence between medical and pharmaceutical interests, with the former actively co-

operating with industry actors to expand the use of hGH into new indicators. In the process Morrison criticises Williams et al for failing to problematize ‘enhancement’ and for not asking how some technologies come to be labelled as enhancements while others are treated as therapies.

5. Pharmaceutical futures in the making

In this final section contributors focus on pharmaceutical futures, analysing the trajectory of industry research and investment in pharmaceutical products and the dynamic role that expectations play in attracting support and building communities of hope or promise around new medicines (Hedgecoe and Martin 2003). They show how intentions and expectations differ between various stakeholders (e.g. the industry, patients and publics) and the considerable hope that patients in particular invest in future pharmaceutical breakthroughs.

Brown et al consider the importance of expectations when it comes to novel medicines for the treatment of advance-stage cancer. They focus on two dimensions of expectations which they argue have been neglected – hope and trust - and how these relate to each other in the context of heightened uncertainty and vulnerability. Through interviews and observations of patients in the Netherlands who were or had recently been involved in clinical trials, they found that patients were motivated to participate in trials because of hope in trial medications and outcomes and trust in clinicians. Vulnerability created a greater will to trust and to hope and this outweighed uncertainties around the nature of trials and medications. The need to maintain hope and trust in those facilitating hope generated a momentum to keep participating in the trial and to continue taking the medication. These findings are important for understanding the role of expectations in pharmaceuticalization, and in particular how the dimensions of hope and trust involve complex, unfolding processes which are shaped by patients’ sense of vulnerability.

Fisher et al also take a future-orientated approach in their attempt to provide new insights into patterns of pharmaceuticalization by shifting the focus of analysis onto the pharmaceutical industry’s research and development activities. They constructed a database of industry products reported to be in clinical trials between 2006 and 2011 and found that, collectively, industry research and development prioritises the development of products to treat illnesses which are of concern to Western countries such as cancer, where future drugs are likely to

generate more profits for pharmaceutical companies. This pattern was particularly true for the largest companies. For Fisher et al, while the concept of pharmaceuticalization should be viewed from a value-neutral standpoint, their findings suggest that the implementation of that process, in terms of resource allocation, is far from value neutral and highlights the interest of drug companies in investing in drugs for the future and renewing interest in older therapeutics for new clinical targets in ways which will maximise their profits.

Conclusion

Overall these papers demonstrate the value of the concept of pharmaceuticalization, as distinct from medicalization. They show that pharmaceuticalization is itself a complex, dynamic and evolving process, which is at times contradictory. If defined broadly, we can see processes of pharmaceuticalization occurring at both the macro and micro levels, conceptually and substantively speaking, through, for example, the designation of aspects of our lives as targets for (increased) pharmaceutical intervention, as in the case of students perceiving drugs as study aids or the hope invested in developing end stage cancer drugs. Governments, regulatory agencies and medical professionals have been shown to influence who, where and how we can access pharmaceuticals, and thus enable and constrain the extent of and direction pharmaceuticalization takes. It can also encompass the ways in which different interests compete in terms of what pharmaceutical products are invested in and brought to market and how we might understand the various uses of these in everyday life, for lifestyle or ‘enhancement’ purposes as well by doctors and patients for therapeutic reasons. While most analyses to date have focused on western societies, papers in this special issue have shown how the concept maps onto global patterns of poverty and wealth and in particular the value of viewing the actions of pharmaceutical companies on a global level. Finally it has shown how pharmaceuticalization can be applied both upstream focusing on the development, testing and regulation of pharmaceuticals and downstream concerning the meaning and use of pharmaceuticals in medical practice and in everyday life.

Despite this, the concept does have some limitations in its scope and applicability. As we emphasised above and as several papers in this special issue attest, pharmaceuticals are but one part of the contemporary therapeutic landscape. Placing analytic focus on processes of pharmaceuticalization therefore perhaps creates a bias in sociological attention to

pharmaceutical matters, privileging these above and beyond other therapies or modes of (in)action.

Conceptually, the process of pharmaceuticalization is best located in the heterogeneous socio-technical assemblage that constitutes the 'pharmaceutical regime'. The socio-technical regime associated with the development, sale and use of pharmaceuticals is based on three central features; the close association of medicine with science, the dominance of a science-based pharmaceutical industry with strong links to basic research and the medical profession, and a central role played by government agencies in regulating the process of drug development, production and sale. Furthermore, the regime can be analysed along cognitive, organisational and technological dimensions. That is to say it can be understood as a network of institutions, organisations, actors and technological artefacts, alongside those cognitive structures associated with the creation, production and use of therapeutics. This framework therefore provides a way of understanding pharmaceuticalisation in terms of an expansion (or contraction) of this regime in particular sites at both macro and micro level or along cognitive, organisational or technological dimensions. In some of the cases described in this special issue growth in the regime occurs through the adoption of new technologies (products) or by the spatial expansion of established networks into new territories. Whilst in other cases, this growth is associated with the enrolment of new actors (e.g. patient groups) or changes in the cognitive structures (regulations) that govern the use of particular products. This points to the need for more empirical research to further map the contours of the regime in different spaces, the dynamic processes that underlie the expansion and contraction of the regime over time, and the different forms of knowledge that are embedded in various practices, artefacts and forms of governance.

It is hoped that the papers in this special issue have helped take this task of analysing the dimensions of pharmaceuticalization forward. Much remains to be done, nevertheless, including more detailed case studies of particular drugs and categories of drug and historical and comparative analyses of the process of pharmaceuticalization at a macro level. We might also profitably point here, in terms of future agendas, to more work not simply on the *affective*, *spatial* and *temporal* dimensions and dynamics of pharmaceuticalization, but the *digital* dimensions too, not least the prospective role of various digital apps to monitor and manage if not optimise ourselves in the future pharmaceuticalisation of life: the advent of pharmaceuticalization 2.0 perhaps? To the extent, moreover, that much of this work to date has focused on the human dimensions of pharmaceuticalization, it is time perhaps to redress

the balance in terms of the pharmaceuticalization of animals, from the use of animal models to antibiotics' use in intensive farming and the medication of pets. Finally, in a critical reflexive vein, we should also be mindful of course, *qua* social scientists, of our own role in these very discourses and debates, from questions of co-production to matters of a normative kind and links to wider public and policy agendas, particularly in these 'impact' driven times of ours.

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