Networks and network analysis in evidence, policy and practice

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As readers of *Evidence and Policy* will know, the use of evidence in policy and practice is both a complex process and a complex outcome, affected by a wide range of factors and correspondingly difficult to document and evaluate (Oliver *et al.*, 2014; Holmes *et al.*, 2017). Many commentators agree that evidence use – whether we call it knowledge exchange, research impact, or some other variant – is essentially a relational process, and takes place in social settings (Dobrow, Goel and Upshur, 2004; Mitton *et al.*, 2007; Weiss *et al.*, 2012; Oliver, Lorenc and Innvær, 2014; Cairney, Oliver and Wellstead, 2016; Ward, 2017).

What would it mean to take this relational aspect of evidence use seriously? Theoretically significant mechanisms of evidence-policy interactions are determined, or at least strongly influenced, by social context. The availability of evidence (Contandriopoulos *et al.*, 2017), the interpretation of what is credible and relevant (Pearce, Anna and Hal, 2014; Tchilingirian, 2018), and how relationships and meanings are negotiated (Faul, 2016; Smith and Stewart, 2015) all depend on social relations. Evidence use in policy and practice is significantly shaped by who is included, the conversations they have, how they are connected (or not), and the dynamics of their relationships. This means we can better understand processes of evidence use by examining the relationships that structure social settings – specifically, who is involved and how they relate to one another. Knowing who is taking part and how they are connected is vital to decoding, and ultimately influencing, evidence and policy processes.

Fortunately, there are a range of specialist relational theories, concepts and methods. Certain researchers use the word network as a heuristic or metaphor to describe a (relatively recent) organising principle or social architecture that is assumed to be more agile and less formal than a hierarchy of states or markets (Finnemore, 1996; Parker, 2007; Slaughter and Hale, 2004. Networks are also described as a means to bring policy and evidence communities together by creating links between individuals and organisations (Cooper, 2014; Ward, 2017; Ranchod and Vas, 2018) – still using network as a metaphor, rather than an analytical concept.

Other approaches treat networks more formally, deploying specific concepts (such as density, reciprocity, centrality and embeddedness) to identify core network properties. This involves using formal methods collectively known as Social Network Analysis (or SNA), which exploits a branch of mathematics (graph theory), allowing the simultaneous consideration of multiple social relationships (Everett, Borgatti and Johnson, 2013). SNA has its roots in the disciplines of sociology, anthropology and psychology, and is useful in calculating social distances between network members and visualising the relational terrain of networks (Scott, 2000). Less formal methods tend to be qualitative in nature, and reveal the meaning that individuals ascribe to their relationships and their normative commitments to them (Emirbayer and Goodwin, 1994; Crossley, 2010), although often still using SNA to map and visualise social structures.

Both formal and inductive network approaches have been applied to the question of evidence use. Researchers have used network analysis to map and analyse policy communities (Leifeld, 2010; Ingold and Varone, 2012), to identify key *individuals, relationships* and *microstructures* within them (Valente and Pumpuang, 2007; Christopoulos and Ingold, 2015) or which salient actors are involved in and excluded from decision-making (Faul, 2016). Similarly, researchers have mapped how *whole networks* of individuals involved in policy and evidence provision influence evidence use (Contandriopoulos *et al.*, 2017, Riemsdijk, 2015), and used probability modelling to assess how

much network structure predicts evidence use (Shearer, Dion and Lavis, 2014). Elsewhere, researchers have focused on the *meaning* of ties and relationships, and how they evolve (Haynes *et al.*, 2011, 2012). Using mixed methods to explore the structure and meaning of networks has told us about the conditions under which evidence use occurs (Ingold, 2011; Oliver *et al.*, 2013) and helped shape our ideas about why some forms of evidence have more salience for policy than others (Oliver *et al.*, 2013; Weishaar, Amos and Collin, 2015). Predominantly in health, interest is growing in how to design network interventions which actively exploit social structure to disseminate health messages (Valente, 2010), or improve implementation of evidence-based practices (Valente, 2010; Kim *et al.*, 2015; Yousefi-Nooraie *et al.*, 2015).

With a few exceptions (e.g. Weishaar, Amos and Collin, 2016) it is rare to find these different approaches used by the same researcher, and cross-fertilisation is uncommon. In the small community of researchers and practitioners who work on evidence, and policy, and networks, we asked how can this variety of network approaches contribute to our understanding of how evidence comes to be constructed and is used in policy and practice. There are significant gaps in our understanding of how relationships influence evidence use; how networks have been theorised and operationalised; and the methods we can use to investigate network structure, ties and meaning. In this special issue, we bring together cutting-edge research and commentary on some of these questions, to enable a more holistic understanding of the potential contributions of networks and network analysis to understanding the use of evidence.

We received a very large and diverse response to this call, and therefore were not able to include all of the excellent submissions we received; some of which will appear at a later date in the main journal. Disciplines as diverse as health policy and public health (Shearer, Jessani), education (Hopkins), and environmental management (Reed) are represented, in addition to submissions from business, trade and investment, science policy, technology and innovation studies, and conservation which will hopefully contribute to thriving debates in their own disciplines. In addition, we are pleased that two of our papers (Shearer, Oranje) report research and practice from low- and middle-income countries, which reflects the growing interest in how to support resource-intensive evidence use practices beyond the global north (Stewart, 2017).

In this special issue, we selected those papers which we felt made the strongest contribution to our *understanding of how networks and network analysis can help us to understand how evidence is used in policy and practice*. Thus, this collection of papers illuminate the key structure/agency debate; explain the ways in which diverse network membership - and the reasons behind initiating and maintaining relationships - matter; as well as challenging us to look beyond our usual disciplinary norms and practices, as we now summarise.

Firstly, a classic conundrum across the social sciences is how structure and agency interact to produce social outcomes. With regard to evidence and policy change, network structure is theorised to affect network members' access to and influence over each other (Burt, 2002), at the same time as network members are theorised to have a degree of agency to change the structure of their networks (Emirbayer and Goodwin, 1994). Shearer et al add a piece to this puzzle by showing that the structure of policymaker's networks influenced the likelihood of their using evidence, and the decisions that they ultimately made. Reed et al also show that network members responded to a perceived weakness in a network by creating a brokering organisation to shift the social dynamics of evidence use. Establishing this is a very important step for the evidence and policy field, as it shows the importance of understanding who policymakers are connected to, and the possible impact for researchers of becoming better connected to policymakers. De Leeuw et al. offer suggestions on how network structure can be used and influenced to support evidence into policy. Furthermore,

Smith and Weishaar show that network members exercise agency in rewiring their network structures - changing the frequency of communication and connection - to influence policy change; a finding echoed by Ward et al, who showed how managers used networks to create and access knowledge to address local policy issues. Frequency of interactions and encounters was the key factor that led to agreement of goals and consensus on the meaning of evidence, while giving the impression of a coherent community, all of which contributed to policy change. Oranje et al describe their experience being involved with a network of parliamentary committees across Africa, in which the network operated to remove barriers to evidence use, and created a 'sense of competition' between members, creating the climate for action on evidence use. In addition to offering some insights into *how* (not just *whether*) network structures can lead to policy outcomes, their findings imply a set of features linking evidence and policy – and some possible suggestions for those wishing to assist these processes.

Second, several of the papers in the Special Issue show that the diversity of network members carries important implications for the evidence and policy space. Shearer et al use a comparative approach to show how greater diversity of network membership exposes policymakers to new ideas and evidence. Even more excitingly, the authors show that greater diversity led to increased innovation in policy decisions; in other words, the more varied the evidence 'diet', the more policymakers were able to embrace new policy directions and tools. Jessani et al also show the benefits that accrue to universities (evidence 'providers'), since diversity in networks increases their visibility, and offers a way to generate more collective influence and network resilience.
. Ward et al show that networks served the important purpose of making visible "alternative programmes of action and allowed actors to identify and negotiate the commensurability of these distinct programmes and the viability of their collective mission." Thus, it was through the networks that courses of action were negotiated and enacted. Using network analysis in one policy debate, Reed et al reveal the relative dominance of interest organisations in contrast to the relative isolation of research institutes, therefore showing importance of these positional analyses for understanding research impact. Diversity is also discussed by Smith and Weishaar who argue that a diverse set of voices helps network cohesiveness, and by Hopkins et al who show that brokers can play an important role in bringing diverse sources of knowledge into the policy and practice space These papers thus provide a solid empirical evidence base – and methodologies - for those calling for greater participation and deliberation in both research (Degeling, Carter and Rychetnik, 2015; Oliver *et al.*, 2015; Degeling *et al.*, 2017) and policymaking (Boivin, 2014; Conklin, Morris and Nolte, 2015; Fung, 2015)

Third, in addition to mapping networks, it is critical to examine the reasons for which networked relationships form and develop. Smith and Weishaar offer us a nuanced analysis of two policy networks which formed around the smoke-free legislation and inequalities debates in the UK / England. They show us that simply being part of a network can tell us little if we do not understand the roles (advocate; expert) which network members adopt, and how they interpret these roles. De Leeuw et al's paper helpfully theorises the importance of shared values and discursive frames in explaining how and why clusters in policy networks may form. Reed et al describe the importance of trust in creating meaningful change (in both networks and policy outcome), and show how the network structure itself was engineered to create better conditions for evidence use. Taken together, these papers suggest that how actors form connections is deeply influenced by their beliefs and values, an insight that has immense importance for understanding how evidence may reach policy.

Fourth, brokerage is a key process in relational evidence-policy exchanges. Hopkins et al (2018) show that the role of formal institutional brokers in promoting evidence use goes beyond positioning

themselves as 'hubs' in the educational policy space. They show how a key broker organisation helps enable different micro-structures which support researchers in forming diverse networks at the same time as they aid policymakers to access otherwise inaccessible research. Oranje et al also describe the role of a network linking committees helped to change evidence use behaviour, build capacity, and create linkages with a broader community of academics and researchers.

Finally, network analysis is only as helpful as our interpretation of it. In practice, Jessani et al also suggest that network analysis can provide networks - and their members - ways to monitor this kind of exchange process, allowing them to develop strategies to better map and engage with audiences for their research. Ward et al note that their narrative analysis of how networks were *enacted* enabled them to explore knowledge creation. Reed et al offer suggestions for how network analysis can document the messiness of the social dynamics around evidence use, enable changes in the social and organisational environment, and provide evidence of research impact. De Leeuw et al.'s reflections on how political science theories of agency, belief systems, and policy systems can be brought into confluence with network analysis offer new directions for research.

Future directions

While developing our understanding of what network analysis and network approaches can offer those wishing to investigate evidence-policy-practice interfaces, there remain important unanswered questions. This set of papers helps us to delineate a clear research agenda for future studies.

1. **Use network approaches to optimise evidence use interventions:** The hardest lesson for those researchers seeking impact is the need to take research into influencing policymakers as seriously as they take their own field. Important literatures on influence between individuals exist in disciplines from cognitive science ((Lawler, Lakoff and Johnson, 1983; Cialdini, 1993) to management (Cialdini, 1993). In this Special Issue, we offer a series of articles that provide important evidence of the networked and relational influences on evidence and policy. Yet of the multitude of initiatives, interventions, collaborations and programmes which aim to increase evidence use, we see few which (a) use a relational approach to identify the structure of the community they are hoping to influence, or key actors within it, or (b) discuss ways to identify, create, maintain and use relationships in a systematic way, or aim to evaluate their impact in terms of relationships (for example, Shearer 2015). Whilst there have been attempts to use more or less formal relational approaches systematically in practice (Dershem et al., 2011; USAID, 2014, for example), there is still scope for the wider use of network approaches. We believe this lack of uptake of network approaches may account for much of the continued failure to demonstrate consistent evidence uptake; akin to trying to mend clockwork blindfold.

2. **Reasons for - and human labour involved in - creating networks:** There is evidence that initiatives aiming to create communities and ties between academics and policymakers help support evidence-informed policymaking (Cooper, 2014; Traynor, Dobbins and DeCorby, 2015; Ranchod and Vas, 2018). However, policymakers draw on broader forms of evidence and expertise, and this diversity must be reflected in future research agendas (as identified in Oliver et al. 2016). It is recognised that building meaningful relationships takes significant commitment and resources, including developing an environment of mutual trust, transparency and honesty. As Smith and De Leeuw identify, understanding how belief systems and values influence participation in research and policy processes is vital to parsing out who becomes connected, how and why. We need to better understand the human work which goes into creating and maintaining meaningful ties; how they are best supported; and the influence of shared beliefs

and values in creating and maintaining ties in order to give a fuller account of evidence-policy processes.

3. **Explore how networks form, and how to recruit and maintain diverse network membership:** The papers above strengthen calls to diversify the evidence base for decision-making through recruiting and maintaining relations with a heterogeneous set of evidence providers within diverse networks. Furthermore, more evidence is required on how to initiate and maintain relations with such a diverse group of individuals and organisations. Rather than conflating 'evidence' with 'academic research', future research needs to disentangle the many sources of evidence that policymakers use, including from interest groups, think tanks, and between fellow policy experts working in the same domain. Grønvad, 2015 identifies closure of networks – and available evidence and policy options - through overlapping network memberships, while Varanda Duarte and Carvalho (2015) offer a model for detecting – and then targeting - key actors in the policy-evidence space. Diverse networks are clearly vital to improving the diversity of the evidence base - and therefore the options - available to policymakers, but how to support the organic evolution of networks (As opposed to imposing formal structures on existing social relations) is unclear.

4. **Describe the strategies used to manipulate and rewire networks**. Strategically deciding to create network ties, exploit them, and to control the formation and dissolution of ties elsewhere in the network is, we can hypothesise, an immensely powerful way to influence policy and the evidence policymakers see. Yet, empirical evidence on this is extremely challenging to collect, although our papers offer intriguing suggestions that this is a fruitful avenue to explore.

5. **How network structure influences members:** Many researchers and policymakers in fact hold hybrid or multiple roles in the research and policy space. We need to better understand not just how boundary spanning and brokering may influence evidence use processes, but how the community around individual boundary spanners and brokers shapes the beliefs, values and practices of researchers and policymakers. How does it influence academic researchers, for example, to be connected to policymakers? Tchilingirian (2015) suggests privilege is conferred by relative centrality/peripherality in the network structure; while in the clinical trial reported by Pescosolido et al. 2015 show that less embedded network members whose ties bridge across more densely linked clusters tend to volunteer to participate in knowledge exchange. How does this influence network members' views? Do we hold different views about advocacy, for example, if we have never participated in policy discussions?

6. **The role of power in, around and through networks:** Networks are social structures that are commonly assumed to describe a non-hierarchical social order. And yet the topics above indicate the utility of network approaches to bring these relations of power into clearer focus. Using network analysis shows the ways in which certain policy or evidence actors can be excluded from the network (Grøvan, 2015), and that the network structure may privilege certain actors and not others (Tchilingirian, 2015). Furthermore, social stratification outside the network can influence both who is included/excluded and their position in the network structure (Faul, 2016). For the purposes of this Special Issue, these exclusions matter in the effects can have on the diversity of evidence and policy options that are visible to, and therefore available to, policy actors.

7. **Identify effective and efficient network structures for evidence and policy processes:** Although a number of useful suggestions have been made, however cautiously, about how to foster the kinds of interactions and network structures which best deliver useful, relevant and timely evidence to policymakers. More research is needed to understand how interventions to increase research uptake may influence network formation and evolution.

8. **Use and apply network terms more carefully and clearly:** There is still significant variation in how researchers use and interpret terms like network, tie, relationship, broker and link – probably because while they all have discipline-specific meanings as technical terms, they also have general meanings. With a few exceptions, political scientists in general have used the concept of networks without developing it (e.g. Marsh 1994) , exploiting its explanatory potential, or utilising specialised methods to map and analyse network structures (Dowding, 1995). Bringing theories of political processes, and other social theories together with network analytical approaches must go alongside more careful operationalisation of network concepts. We call for more clarity about the use of network terms and approaches, so that they can be applied and interpreted more effectively. What analytical work does 'network' do in a study? What theory or perspective does it imply? Without such clarity, it is too easy to make assumptions which muddy the interpretation of complex social processes.

Ultimately, network analysis will not be able to tell us everything we need to know about the complex challenge of evidence use in policy processes. There is unlikely to be one structure which will work across all contexts. Indeed, "Most of the information and knowledge will not be exchanged on the basis of one-to-one relationships between researchers and policymakers, but through the creation of an ecosystem that allows research knowledge to be brought to bear along with the views of other policy actors participating in the policy network." (Ranchod and Vas, 2018, pp.14). Our task as researchers is to explore this ecosystem, and to support a healthy, diverse, and dynamic set of interactions between individuals and organisations working on evidence and policy and practice, examining the impact that environments have on individual and organisational behaviour and the viability of those organisations and relationships. Network analysis offers a unparalleled window onto the relations that flourish – and those that do not – in the evidence-policy ecosystem we study or work in.

Understanding this broader ecosystem is a huge challenge for the whole of the evidence policy field. We hope that this set of papers has illustrated some key ways in which network analysis and network approaches can help us to identify, map and understand relations and networks inside this ecosystem, and has illustrated some promising avenues to develop this fascinating and important area of study.

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