

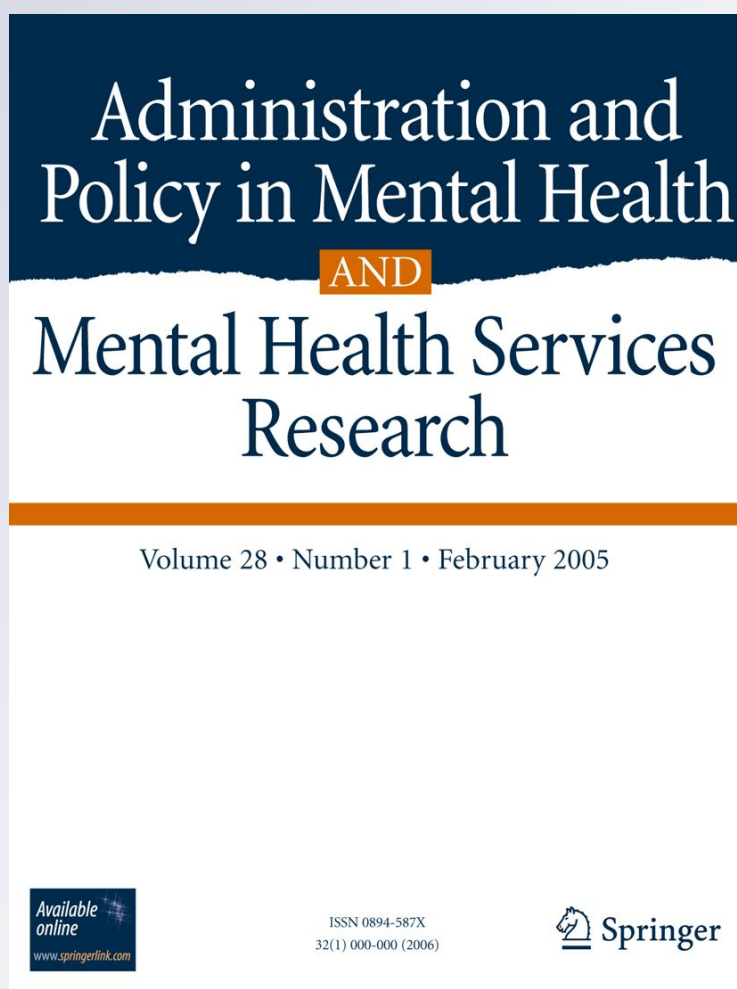
Using Social Network Analysis for Assessing Mental Health and Social Services Inter-Organisational Collaboration: Findings in Deprived Areas in Brussels and London

Pablo Nicaise, Simon Tulloch, Vincent Dubois, Aleksandra Matanov, Stefan Priebe & Vincent Lorant

Administration and Policy in Mental Health and Mental Health Services Research

ISSN 0894-587X

Adm Policy Ment Health
DOI 10.1007/s10488-012-0423-y



 Springer

Your article is protected by copyright and all rights are held exclusively by Springer Science+Business Media, LLC. This e-offprint is for personal use only and shall not be self-archived in electronic repositories. If you wish to self-archive your work, please use the accepted author's version for posting to your own website or your institution's repository. You may further deposit the accepted author's version on a funder's repository at a funder's request, provided it is not made publicly available until 12 months after publication.

Using Social Network Analysis for Assessing Mental Health and Social Services Inter-Organisational Collaboration: Findings in Deprived Areas in Brussels and London

Pablo Nicaise · Simon Tulloch · Vincent Dubois · Aleksandra Matanov · Stefan Priebe · Vincent Lorant

© Springer Science+Business Media, LLC 2012

Abstract Fragmentation in mental health and social care delivery should be addressed at the system level. A Social Network Analysis was carried out on relations between services in order to assess Leutz's levels of care integration: linkage, coordination, and full integration. Findings for deprived areas in Brussels and London show that linkage across clusters of services is weak in both networks. However, the integration of care relies on the level of linkage in London, while in Brussels it is more dependent on central services playing brokerage roles. The method offers a useful and complementary basis for evaluating the integration of care.

Keywords Mental health · Social care · Organisational model · Social Network Analysis · Partnership practices

Introduction

As a result of the deinstitutionalisation of psychiatric service users, fragmentation in mental health care delivery systems has become a public mental health issue in many Western countries (Morrissey 1999; Glasby and Dickinson 2008). Fragmentation contributes to inefficiency and ineffectiveness in healthcare delivery, and to health inequalities

(Fiscella et al. 2000). There is in particular a lack of continuity and coordination in health and social care delivery, due to many structural divisions, separate administrative and policy sectors, complex and diverse funding schemes, and distinct professional backgrounds. This particularly affects people with chronic, multiple, and complex needs, such as socially marginalised people with mental health disorders. Compared to wealthier groups, marginalised people have a higher risk of mental disorders, have poor access to specialised care (Alegria et al. 2000), and are more likely to develop chronic or persistent episodes of mental disorders (Lorant et al. 2003; Cohen and Thompson 1992; Padgett et al. 2006; Strandh et al. 2011; López and Guarnaccia 2000; Rössler et al. 2010). These vulnerable patients require care of both a medical and social nature within a multidisciplinary integrated approach, covering a wide variety of physical, mental health, and social care interventions. However, in a fragmented delivery system, care is provided by separate agencies, with few effective partnership agreements. The overall quality of care therefore depends on the effectiveness of each agency but also on the ability of agencies to collaborate in order to provide high quality integrated care. In the health and human services sector, outcomes such as integrated care delivery are understood to be emergent properties of inter-agency collaboration (Provan et al. 2007; Provan and Milward 1995).

Research has been investigating how to improve integration of care delivery for such vulnerable groups (Bickman 1996; Fleury and Mercier 2002; Freeman and Peck 2006; Goldman et al., 1992; McGrew et al. 2003; Morrissey et al. 1985; Rosenheck et al. 2002). Integration of care can be achieved with the help of tools and interventions at three different levels: the level of the user, e.g. case management or individualised care planning, the level of the services, e.g. comprehensive community mental

P. Nicaise (✉) · V. Dubois · V. Lorant
Institute of Health and Society (IRSS), Université Catholique de Louvain, B1.30.15, Clos Chapelle-Aux-Champs, 1200 Brussels, Belgium
e-mail: pablo.nicaise@uclouvain.be

S. Tulloch · A. Matanov · S. Priebe
Unit for Social and Community Psychiatry, Queen Mary University of London, Newham Centre for Mental Health, London E13 8SP, UK

health centres, and the level of the whole system, e.g. referrals or managed care (Morrissey 1999). Most studies have focused on processes and outcomes at the user and service levels. At these levels, there is a lack of consensus on how to define integration of care, how to measure it, and which data sources best capture the concepts measured. For example, a systematic literature review of methods in integrated healthcare delivery identified twenty-four different measurement methods in the 24 references included (Strandberg-Larsen and Krasnik 2009).

At the system level, a few studies have been carried out on mental healthcare delivery programmes, such as the Robert Wood Johnson Foundation (RWJF) programme on care integration (Morrissey et al. 1994; Lehman et al. 1994) and the ACCESS programme for mentally ill homeless persons (Goldman et al. 1992; Rosenheck et al. 2002). Although a better integration of care reduced redundancy in service provision at the system level, these studies failed to detect a measurable effect of strategies for system integration at the level of the user. All these results indicate that the fragmentation issue in mental health and social care delivery systems should not be assessed at the user or service levels alone. A system perspective is required.

Unlike the RWJF and ACCESS programmes which restricted integration of care to intensive coordination of clinical, fiscal, and administrative aspects of care, Leutz (1999) described three levels of integration within health and social care delivery systems based on a review of policies in the USA and the United Kingdom. The three levels are: *linkage*, a direct connection between health and social services; *coordination*, where an agent in a central position organises contacts and exchanges; and *full integration*, where health and social care delivery is integrated in one single specialised organisation. He suggested that these three levels of integration correspond to different users' needs, such as severity of the user's disorders, stability, urgency, or self-management. These levels also allow different integration policy operations, such as information exchanges, case management, and care funding. Leutz did not however indicate how to empirically assess these patterns of relations between services.

Morrissey et al. (1985, 1994) pointed to the potential of Social Network Analysis (SNA) for assessing the global organisation of systems of services in mental health care delivery. They investigated three types of relations between services—referrals, planning coordination, and resources flows—with the help of three SNA measures: density, centralisation, and fragmentation. Pescosolido also acknowledged the potential of SNA for exploring the social context and environment in health care (Pescosolido 2006). This approach was extended by Provan, Milward, and their colleagues. They also carried out several studies on networks of mental health services in the USA using similar

SNA indicators and others, such as multiplexity, cliques, and embeddedness (Huang and Provan 2007; Provan et al. 2002; Milward and Provan 1998; Provan and Sebastian 1998; Provan 1997; Provan and Milward 1995; Provan and Kenis 2008; Milward et al. 2010). Whereas Morrissey investigated the integration of care from a public health perspective, relating services relationships with health and health policy outcomes, Provan and Milward focused on the relationships between health services from the field of administration and public management sciences. Their studies were more concerned with governance within networks and structural effectiveness. They argue that SNA at a whole network level of study is an effective method to compare networks in different policy domains and an effective means of assessing the level of integration within a network (Milward and Provan 1998; Provan and Milward 1995; Provan and Kenis 2008).

In this article, we apply the SNA framework developed by these scholars to Leutz's levels of care integration in the relationships between mental health and social care services at the systemic level. Moreover, we extend Provan's argument by suggesting that these indicators are relevant to compare networks of services in different policy systems.

Methods

Data Collection

Data were collected as part of a cross-national research project looking at practices in promoting mental health in socially marginalised people in Europe (PROMO), which involved 14 European countries. The study addressed six marginalised target groups: the long-term unemployed, street sex workers, refugees/asylum seekers, irregular migrants, homeless people and travelling communities. In each country's capital, two areas with a population size of between 80,000 and 150,000 inhabitants and with high deprivation indices were selected. Within these areas, all mental health and all social care organisations for the six targeted groups were selected. Drug addiction services, emergency departments in general hospitals, and other primary care services were also included. Services were classified into five categories: group-specific mental health (A1), generic mental health (A2), group-specific social care (B1), generic social care (B2) and general health (C) services. Group-specific services were those that provided care mainly to one or more of the six target groups. According to Leutz's theoretical framework, group-specific mental health services (A1) were considered fully integrated, as they provide both mental health care and group-specific social care.

Data on services were collected during questionnaire-assisted face-to-face interviews between September 2008 and June 2009. Full details on the PROMO research and data collection methods have been published elsewhere (Priebe et al. 2012). The questionnaire covered a wide range of topics including funding, staffing, accessibility, client inclusion and exclusion criteria, services provided, evaluation programmes, and coordination with other services.

This last heading included networking data on referrals (“Does your service send referrals to/receive referrals from other services?”) and routine meetings (“Does your service have routine meetings on a regular basis with other services?”). Key informants (managers of the services or members of staff with relevant knowledge) in each service stated whether their service had been involved with other services regarding referrals or regular routine meetings during the year prior to the interview, in relation to at least one of the six target groups of the study. Key informants were free to mention as many services as they wanted. Networking data were processed with the network analysis software *Pajek* (de Nooy et al. 2005).

Findings for two areas, namely the communes of Schaerbeek and St-Josse (taken together as one) in Brussels (Belgium) and the London Borough of Tower Hamlets, are presented here. These two European capitals offer an interesting case for a comparative study, as the health system of the former allows users to circulate freely among health and social providers (Gerken and Merkur 2010), while in the latter, access to specialised services is organised on a geographical basis with a referral system from primary care providers acting as gatekeepers (Boyle 2011). Moreover, both areas share a series of characteristics: each area is situated within the second ring of its inner capital city; each area is among the most densely inhabited areas of the city (approximately 16,000 inh/km² in Schaerbeek-St-Josse, and 12,000 inh/km² in Tower Hamlets), both include the highest ethnic minority populations in their respective capitals (mainly Turkish and Moroccans in Schaerbeek-St-Josse, and Bangladeshis in Tower Hamlets), and both areas are among the most socially deprived of their respective countries, in terms of employment, educational level, and level of income.

Data Analysis and Measures

SNA is used to investigate the relationships between various actors (*nodes*), to identify the structural patterns of relations (*ties*) they exist within, and to analyse the effects that the relationship structure has on them (Scott 2000). It combines graphical representation of nodes and ties with a calculated assessment of their structural properties. Within the frame of this study, the services selected were

considered as nodes, and ties were established between them when they declared having had regular routine meetings or referrals during the year prior to the interview.

Linkage Density and Whole Network Characteristics

The first level of integration, linkage between services, can be measured with the help of degree and density measures. The (*all*)-*degree* of a node is the number of ties it receives from (*in-degree*) and sends out to (*out-degree*) other nodes. Because each tie connects two nodes, the sum of the all-degrees in a directed network must equal twice the total number of ties (Scott 2000). Nodes can be characterised with attributes. Groups of nodes with shared attributes are called *clusters*. In our study, the type of service (A1, A2, B1, B2, and C) is an attribute of the nodes. The degree distribution amongst clusters and the average degree of the whole network are indicators of the density of ties in the network. Average degrees can also be calculated and compared across sub-networks, e.g. the intra-cluster and the inter-cluster linkage densities, or across different networks in a cross-sectional comparison. Within the frame of our study, these measures are indicators of the development of the linkage through referrals and routine meetings between mental health services, between social care services, or across these two groups of services. To ensure continuity of care for socially deprived users with mental disorders, we would expect a high density of connections across the mental health and the social care clusters of services.

Sub-networks with higher levels of linkage density can be identified. An example of this is a *clique*, which is a maximally complete sub-network. In other words, a clique is a group of at least three nodes (*triad*) where every node is directly connected to all the others. As the number of possible ties grows exponentially with each node added, big cliques are rare in real world networks. However, the denser parts of a network are usually formed of overlapping connected triads (cliques of three nodes), which are called *overlapping cliques* (de Nooy et al. 2005). It is possible to count the number of tied triads in overlapping cliques, and to separate triads connecting nodes with similar attributes from triads connecting nodes with dissimilar attributes. The tendency of nodes to connect with similar nodes is known as *homophily*, and the inverse tendency is known as *heterophily*. In the analysis of the relationships between mental health and social care services, the number of homophilic/heterophilic tied triads indicates whether agencies offering similar services tend to link together or to link with complementary agencies. It completes the measures of the intra- and the inter-cluster linkage density on the capacity of the network of services to offer continuity of care.

Coordination, Centrality and Brokerage Roles

The second level of integration is coordination of services, which can be measured with the help of centrality measures. Coordination is possible when a node is structurally placed as an intermediary between two other nodes. This can be measured with the *betweenness centrality* (Freeman 1979). Considering that the distance between two nodes is the number of ties which is necessary to connect them, the betweenness centrality of a node n is the proportion of the shortest distances between pairs of nodes i and j ($i, j \neq n$) that pass through the node n in question to the total of the shortest distances between pairs of nodes. Betweenness is a powerful indicator of the level of control and communication of a node in the network. It measures the extent to which a specific node may take on brokerage roles between clusters of nodes, e.g. in referrals. Coordinating organisations, in theory or in practice, are expected to have a high betweenness centrality. The distribution of betweenness centralities of nodes in the network makes it possible to calculate an overall *betweenness centralisation* indicator for the whole network. The betweenness centralisation ranges from 0 to 1: a betweenness centralisation of 0 means that all the nodes have an equal betweenness centrality, while 1 means that one node is necessary to connect all the pairs of other nodes in the network. Within the frame of our study, these measures are indicators of the development of a coordination model of integration of care between mental health and social care services. It could be that, despite a low density of linkage across these two groups of services, continuity of care for socially deprived users with mental disorders is ensured through such coordinating agencies.

These measures may be used in combination with the detection of brokerage roles according to the standard typology of Gould and Fernández (1989). In a triad where one node has an intermediary position between the other two, five different roles may be distinguished depending on the group to which the three nodes belong, e.g. mental health or social care services. The broker is called a *coordinator* if the three nodes belong to the same group, a *representative* when the broker belongs to the sender group, a *gatekeeper* when it belongs to the receiver group, an *itinerant broker* when it belongs to a group that is neither the sender nor the receiver group, and finally a *liaison* when all three nodes belong to different groups. SNA allows us to count the number of times each node takes on these specific structural positions and thus to determine the main type of brokerage role taken on by the nodes with the highest betweenness centralities.

Fully Integrated Services

Finally, we pay a specific attention to the positioning of fully integrated services into the networks. According to Leutz's typology, fully integrated services respond to more

significant needs, either on the part of users because their disorders are more severe and they have fewer self-direction capabilities, either on the part of the system in terms of control and management of care. We measure how fully integrated services are involved into the linkage of the network and the centrality of their positions. Fully integrated services might be involved in networks with low levels of linkage, indicating that they deliver comprehensive care for all users. Alternatively, they might occupy the most central positions, indicating that they are more likely to coordinate care for users with more severe and complex needs.

Results: Applying the Method to Brussels and London

Whole Network Characteristics (Table 1)

The two areas selected were similar with respect to the numbers of services selected: 43 in the Brussels area, 38 in the London area. There were 16 mental health services in each area, and 14 and 12 group-specific social services in Brussels and London respectively. There were only 3 and 5 fully integrated services in each network. Overall, the 43 services in Brussels reported having 172 ties, while the 38 services in London reported having 188 ties. In both cases approximately one-third of these ties represented routine meetings (63 and 68 respectively).

Level of Linkage (Table 2)

However, the network in London appeared to be slightly denser than the network in Brussels. In Brussels each

Table 1 Whole network characteristics for the mental health (MH) and social care (SC) services networks in Schaerbeek-St-Josse (Brussels) and Tower Hamlets (London)

| | Schaerbeek-St-Josse Brussels | Tower Hamlets London |
|---|---------------------------------|----------------------------|
| <i>Number of selected services</i> | 43 | 38 |
| By type of service | | |
| (A1) Group-specific MH (fully integrated) | 3 | 5 |
| (A2) Generic MH | 13 | 11 |
| (B1) Group-specific SC | 14 | 12 |
| (B2) Generic SC | 2 | 10 |
| (C) General Health | 11 | – |
| <i>Number of ties</i> | 172 | 188 |
| By relation | | |
| Routine meetings | 63 | 68 |
| Referrals in | 47 | 56 |
| Referrals out | 62 | 64 |

Table 2 SNA measures of linkage for the mental health (MH) and social care (SC) services networks in Schaerbeek-St-Josse (Brussels) and Tower Hamlets (London)

| | Schaerbeek-St-Josse Brussels | Tower Hamlets London |
|---|---------------------------------|-------------------------|
| <i>Linkage density</i> | | |
| Average ties per service (average all-degree) | 8.00 | 9.89 |
| Highest number of ties (service type) | 30 (B2) | 43 (A2) |
| By type of service | | |
| (A1) Group-specific MH | 1.33 | 11.20 |
| (A2) Generic MH | 9.00 | 13.64 |
| (B1) Group-specific SC | 6.36 | 10.67 |
| (B2) Generic SC | 20.00 | 4.20 |
| (C) General Health | 8.55 | – |
| <i>Intra- and inter-cluster linkage density</i> | | |
| Number of ties inside MH cluster | 39 | 76 |
| Number of ties inside SC cluster | 44 | 58 |
| Number of ties between MH and SC clusters | 15 | 54 |
| <i>Homophily and heterophily</i> | | |
| Number of tied triads in overlapping cliques | 17 | 12 |
| Number of MH services tied triads in overlapping cliques | 9 | 1 |
| Number of SC services tied triads in overlapping cliques | 1 | 4 |
| Number of mixed MH and SC services tied triads in overlapping cliques | 2 | 7 |

service averaged 8 ties (average all-degree) and the highest number was 30 (i.e. one service is involved in 30 ties). In London each service averaged almost 10 ties and the highest number was 43.

Important differences were found when the types of services were considered: fully integrated (group-specific mental health services, A1) were in much more direct connection with other services in London than in Brussels, while generic social care services (B2) were in much more direct connection with other services in Brussels than in London. Indeed, on the one hand, fully integrated services (A1) in London had an average (all-degree) of 11.2 ties with other services, compared to an average all-degree of only 1.3 in Brussels. On the other hand, generic social care services (B2) had an average of 20.0 ties with other services in Brussels and only 4.2 in London. Moreover, the highest all-degree of 30 in Brussels was achieved by a generic social care service. This confirms the importance of the involvement of generic social care services within the linkage between services in Brussels. In London, the highest all-degree of 43 was achieved by a generic mental health service (A2).

If we look at the clusters of mental health services and social care services separately, the number of intra-cluster ties was higher than the number of inter-cluster ties in both areas, although the level of linkage between mental health and social care services appeared to be more developed in the London network (54 out of the 188 current ties, or 28.7 %) than in the Brussels network (15 out of the 172 ties, or 8.7 %). These measures indicate that both mental health and social care services tend to develop their linkage with similar services, although the London network appears to be more effective in linking complementary services. This observation is strengthened by the positioning of the fully integrated services in London.

This tendency is confirmed when we compare the clusters of mental health services and of social care services within each network. The mental health services cluster was the most densely connected cluster in London, whereas in Brussels it was the social care cluster. However, the most embedded mental health services in the Brussels network tended to link with other mental health services (homophily), while the most embedded services in the network in London tended to link with other types of services (heterophily). Indeed, when we considered overlapping cliques, it appeared that 9 out of 17 overlapping triads in the Brussels network involved mental health services only, whereas there were only 12 overlapping triads in the London network, 7 of which involving different types of services.

Level of Coordination (Table 3)

The Figs. 1 and 2 show graphical representations of the two networks. Ties are represented in gray scale according to the number of relations that were declared between pairs of services (from 0 up to 6, when both services declared sending referrals to, receiving referrals from, and having routine meetings with each other). Nodes are represented according to their type (see figure legend). The size of nodes is proportional to their betweenness centrality. In Fig. 1, representing the Brussels network, mental health services are situated in the upper left corner and group-specific social care services in the lower right corner. The aforementioned generic social service, in the centre of the graph, as well as one general health service and one generic mental health service, have the highest betweenness centralities. They are more likely to be situated as intermediaries in the connexion between mental health and group-specific social care services. In Fig. 2, representing the London network, mental health services appear on the left side of the graph, and group-specific social care services on the right side. Four services have higher betweenness centrality scores, although globally lower than in the Brussels network: the aforementioned generic mental

Table 3 SNA measures of coordination for the mental health (MH) and social care (SC) services networks in Schaerbeek-St-Josse (Brussels) and Tower Hamlets (London)

| | Schaerbeek-St-Josse Brussels | Tower Hamlets London |
|--|---------------------------------|-------------------------|
| <i>Centralisation and centrality</i> | | |
| Betweenness centralisation | 0.19 | 0.12 |
| Highest betweenness centrality | 0.21 (B2) | 0.14 (A2) |
| <i>Brokerage roles (main) by type of service</i> | | |
| (A1) Group-specific MH | 2 (representative) | 43 (liaison) |
| (A2) Generic MH | 142 (representative) | 155 (gatekeeper) |
| (B1) Group-specific SC | 59 (representative) | 80 (gatekeeper) |
| (B2) Generic SC | 74 (liaison) | 5 (representative) |
| (C) General Health | 60 (gatekeeper) | – |

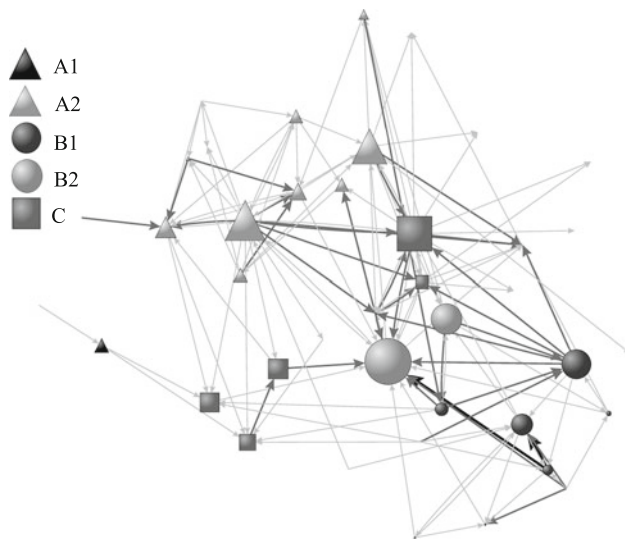


Fig. 1 Brussels, Area of Schaerbeek-St-Josse—Summed ties: routine meetings + referrals, betweenness centrality. The size of nodes is proportional to their betweenness centrality indices. Ties are represented in gray scale according to their weight (min = 0, max = 6). A1 group-specific mental health services, A2 generic mental health services, B1 group-specific social care services, B2 generic social care services, C general health services

health service (A2) on the left side of the graph, one fully integrated service (group-specific mental health, A1) and three group-specific social care services (B1) on the right side of the graph. However, they appear to be situated as intermediaries within their own cluster of services, rather than between clusters.

The network in Brussels was more centralised than the network in London: the overall betweenness centralisation of the network in Brussels was 0.19; for the network in London it was 0.12. The highest betweenness centrality achieved in Brussels was 0.21, which was that of the aforementioned generic social service (B2) with the highest all-degree. This result means that 21 % of the shortest distances between pairs of nodes in the network pass

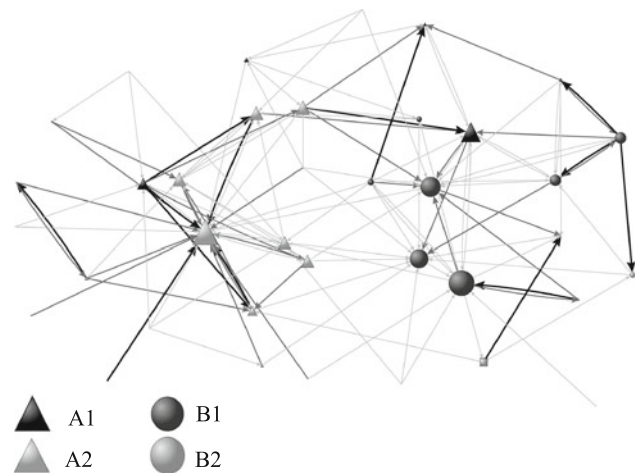


Fig. 2 London, Area of Tower Hamlets—Summed ties: routine meetings + referrals, betweenness centrality. The size of nodes is proportional to their betweenness centrality indices. Ties are represented in gray scale according to their weight (min = 0, max = 6). A1 group-specific mental health services, A2 generic mental health services, B1 group-specific social care services, B2 generic social care services, C general health services

through that generic social service. In London, the highest betweenness centrality, 0.14, was also achieved by the service with the highest all-degree, which was a generic mental health service (A2). Thus, these services occupied the most central positions in their respective networks.

In both networks mental health services took on brokerage roles more often than other services. Group-specific mental health services (fully integrated, A1) mostly had *liaison* positions between the mental health and social care service clusters in London. In Brussels this *liaison* role was played by the generic social care (B2) service with the highest betweenness centrality. These results indicate that fully integrated services in London and generic social care services in Brussels were better placed to play a coordinating role between the mental health and social care clusters of services.

In other respects, both mental health and social care services tended to play a *gatekeeper* role in the London network, receiving ties from outside their cluster and sending ties within their cluster of services. When placed in a broker position, these services were more likely to be referred to by services of a different type and to refer to services of their own type. By contrast, mental health and social care services more often took *representative* positions in the Brussels network, receiving ties from inside their cluster and sending ties out to other clusters. These services were more likely to be referred to by similar services and to refer to other types of services.

This last result, considered along with the levels of inter-cluster linkage presented above, shows that the connection between mental health and social care services was mainly made by those broker services in Brussels, while the connection between mental health and social care services was much less dependent on brokerage services in London: the level of linkage between the clusters of mental health and social care services there was higher and brokerage services, acting as gatekeepers, were not contributing to connecting with other types of services. In Brussels the level of linkage between the clusters of mental health and social care services was lower, although brokerage services, tending to act as representatives, were more involved in connecting services of different types.

Conclusions and discussion

Despite major differences in mental health and social care policies between Brussels and London (Boyle 2011; Gerkens and Merkur 2010), the networks of mental health and social care services investigated comprised similar elements in terms of the number of mental health and social care services, the number of ties claimed, and the distribution of ties among relations. Moreover, in both networks the level of linkage within clusters of services was higher than the level of linkage between clusters, and there were few fully integrated services. This suggests that the fragmentation between mental health and social care services remains an important issue in both countries.

The structural properties of each network, however, show interesting differences. The integration of care in Tower Hamlets (London) is mainly achieved at the level of linkage between services. In Schaerbeek-St-Josse (Brussels), the integration of care is more dependent on some services in central positions that are capable of playing a coordinating role. In London the network of services is denser than in Brussels and the linkage between the mental health and social care clusters is stronger. Moreover, services in London are more likely to connect with other types of services (heterophily). Fully integrated services (group-

specific mental health) play a liaison role between mental health and social care services. By contrast, in Brussels, the network is more centralised than the network in London. Mental health and social care services in Brussels are more likely to connect with similar services (homophily). At the same time, generic social care services play an important liaison role in connecting mental health and group-specific social care services. Moreover, mental health and social care services, when situated in an intermediary position, tend to take on a representative role. The connection between clusters of services mainly relies on these brokerage services. In London these brokerage roles are shared by a variety of services, including fully integrated (group-specific mental health) services and are not so decisive for connecting mental health and social care services.

This could suggest that without a formal organisation of the referrals between services, the agencies offering a complementary service are not well identified, and hence, few services concentrate the circulation of users. However, at present, these results remain mainly descriptive. Indeed, SNA measures structural elements but do not give any information on contextual factors that could explain these structural patterns of connection, or on the quality of the integrated care offered to users with multiple needs. SNA indicators must be linked in later research to policy and public health outcomes for the area under investigation, e.g. the number of involuntary hospital admissions, rates of suicide attempts, or overall morbidity. They could also help us to achieve a better understanding of the relations between system integration and clinical outcomes such as quality of life and social rehabilitation, at the user level. Indeed, Leutz suggested that the three levels of integration of care correspond to the level of severity of the client's disorders and that each level calls for different policy integration measures, such as information exchanges, case management, and financial operations (Leutz 1999). However, we do not know whether the users referred have different clinical profiles in the two areas, or whether the policy needs in terms of exchange of information or case management are different in the two cities.

Although further research is needed to explain the phenomena depicted, these results are consistent with the results of previous studies. In the 1980s Morrissey et al. (1985) pointed out that institutional mental health and community-based services formed separate clusters, with very few inter-cluster links. Later, within the RWJF programme evaluation (Morrissey et al. 1994), one key conclusion was that the density of inter-organisational links and the centralisation of the network structure cannot be maximised at the same time. In our study, we refined this conclusion by putting it in the framework of Leutz's levels of care integration.

Moreover, these results indicate that SNA indicators can contribute to the assessment of the integration of care at the

system level. For example, they indicate that some services in Brussels are well placed, within the network of services, to play a coordinating role. However, these services are currently not mandated to do so. Another example is that of concerns homophilic/heterophilic relations: in order to offer integrated care, services are supposed to develop partnerships with dissimilar services. SNA structural indicators could allow us to evaluate organisational relationships within their policy context and to help policy-makers set priorities for the development of care integration without normative judgements for or against one specific model. They also make it possible to identify gaps in the overall structure of connections, regardless of the level of care integration (linkage, coordination or full integration).

Hence the proposed methodology provides a tool for assessing whether the level of integration or fragmentation is higher in one specific area than elsewhere and for specifying how care integration could be improved at the area level. Conventional methods for assessing health services, such as the European Services Mapping Schedule (Johnson et al. 2000), can reflect with great detail the quantity of services provided, but fail to capture how services are linked. SNA appears to provide a complementary and much-needed perspective.

Within a cross-national framework, SNA at a *whole network* level of analysis offers comparable structural indicators, identifying similarities in network patterns independent of differences in local or national contexts and policies. Some authors suggest that different systems are basically facing the same problems in front-line service delivery (Glasby and Dickinson 2008). These problems could be linked to structural gaps in the achievement of integrated levels of care, at whatever level (i.e. linkage, coordination, or full integration).

Assessing care integration using a cross-national SNA framework also has its limitations. Firstly, there is one traditional limitation of SNA studies that concerns network boundaries. Actors selected for a network analysis are always embedded in multiple types of relationships and networks may always be considered as embedded in larger networks. The criteria for inclusion in the PROMO study, i.e. geographical areas, types of services, and investigated relationships based on referrals and routine meetings, are only part of the “real” set of relationships operating in these services. For example, selected services may have referral or routine meeting relationships with actors situated outside of the investigated areas being investigated and these could not be systematically included.

Secondly, by the same logic, definitions of types of services or of networking relationships have been set in an international context. Due to the huge diversity in health and social care policies across Europe, some disparities may occur in, for example, local understanding of the

criteria for inclusion of types of services or types of relationships, as well as for available data and sources of information (were the data recorded or are they based on informants' estimates?). This may explain why reciprocity in some relationships, e.g. routine meetings, was not as high as expected. Indeed, only 8 out of 63 routine meetings ties were reciprocal in Brussels, and 19 out of 68 ties were reciprocal in London. Further studies will have to rely on more objective data.

While taking these limitations into account, we suggest that SNA can provide a useful framework and key policy indicators for evaluating possible gaps across different types of inter-services integration. This framework will be applied to the complete set of mental health and social care service networks investigated as part of the PROMO study.

Acknowledgments The PROMO study was funded by the Directorate-General for Health and Consumers of the European Commission. The results of this study have been successfully presented orally at the 3rd European Public Health Conference (10–13 November 2010, Amsterdam), and at the 19th European Congress of Psychiatry (12–15 March 2011, Vienna).

Conflicts of interest The authors state that there is no conflict of interest and certify that they take full responsibility for the conduct of the study and for the analysis and interpretation of the data.

References

- Alegria, M., Bijl, R. V., Lin, E., Walters, E. E., & Kessler, R. C. (2000). Income differences in persons seeking outpatient treatment for mental disorders: A comparison of the United States with Ontario and The Netherlands. *Archives of General Psychiatry*, *57*, 383–391.
- Bickman, L. (1996). The fort Bragg experiment. *Journal of Mental Health Administration*, *23*, 6.
- Boyle, S. (2011). United Kingdom (England): Health system review. *Health Systems in Transition*, *13*, 1–483.
- Cohen, C. I., & Thompson, K. S. (1992). Homeless mentally ill or mentally ill homeless? *American Journal of Psychiatry*, *149*, 816–823.
- de Nooy, W., Mrvar, A., & Batagelj, V. (2005). *Exploratory social network analysis with Pajek*. New York: Cambridge University Press.
- Fiscella, K., Franks, P., Gold, M. R., & Clancy, C. M. (2000). Inequality in quality: Addressing socioeconomic, racial, and ethnic disparities in health care. *Journal of the American Medical Association*, *283*, 2579–2584.
- Fleury, M. J., & Mercier, C. (2002). Integrated local networks as a model for organizing mental health services. *Administration and Policy In Mental Health*, *30*, 55–73.
- Freeman, L. C. (1979). Centrality in social networks conceptual clarification. *Social Networks*, *1*, 215–239.
- Freeman, T., & Peck, E. (2006). Evaluating partnerships: A case study of integrated specialist mental health services. *Health and Social Care in the Community*, *14*, 408–417.
- Gerkens, S., & Merkur, S. (2010). Belgium: Health system review. *Health Systems in Transition*, *12*, 1–266.

- Glasby, J., & Dickinson, H. (2008). *International perspectives on health and social care: partnership working in action*. Oxford: Blackwell.
- Goldman, H. H., Morrissey, J. P., Ridgely, M. S., Frank, R. G., Newman, S. J., & Kennedy, C. (1992). Lessons from the program on chronic mental-illness. *Health Affairs, 11*, 51–68.
- Gould, R. V., & Fernández, R. M. (1989). Structures of mediation: A formal approach to brokerage in transaction networks. *Sociological Methodology, 19*, 89–126.
- Huang, K., & Provan, K. G. (2007). Structural embeddedness and organizational social outcomes in a centrally governed mental health services network. *Public Management Review, 9*, 169–189.
- Johnson, S., Kuhlmann, R., & Epcat, G. (2000). The European service mapping schedule (ESMS): Development of an instrument for the description and classification of mental health services. *Acta Psychiatrica Scandinavica, 102*, 14–23.
- Lehman, A. F., Postrado, L. T., Roth, D., McNary, S. W., & Goldman, H. H. (1994). Continuity of care and client outcomes in the Robert Wood Johnson Foundation Program on chronic mental illness. *Milbank Quarterly, 72*, 105–122.
- Leutz, W. N. (1999). Five laws for integrating medical and social services: Lessons from the United States and the United Kingdom. *Milbank Quarterly, 77*, 77–110.
- López, S. R., & Guarnaccia, P. J. (2000). Cultural psychopathology: uncovering the social world of mental illness. *Annual Review of Psychology, 51*, 571–598.
- Lorant, V., Deliege, D., Eaton, W., Robert, A., Philippot, P., & Anseau, M. (2003). Socioeconomic inequalities in depression: a meta-analysis. *American Journal of Epidemiology, 157*, 98–112.
- Mcgregor, J. H., Pescosolido, B., & Wright, E. (2003). Case managers' perspectives on critical ingredients of assertive community treatment and on its implementation. *Psychiatric Services, 54*, 370–376.
- Milward, H. B., & Provan, K. G. (1998). Measuring network structure. *Public Administration, 76*, 387–407.
- Milward, H. B., Provan, K. G., Fish, A., Isett, K. R., & Huang, K. (2010). Governance and collaboration: An evolutionary study of two mental health networks. *Journal of Public Administration Research and Theory, 20*, 1125–1141.
- Morrissey, J. P. (1999). Integrating service delivery systems for persons with a severe mental illness. In A. V. Horwitz & T. L. Scheid (Eds.), *A handbook for the study of mental health social contexts, theories, and systems* (pp. 449–483). Cambridge: Cambridge University Press.
- Morrissey, J. P., Tausig, M., & Lindsey, M. L. (1985). Community mental-health delivery systems: A network perspective. *American Behavioral Scientist, 28*, 704–720.
- Morrissey, J. P., Calloway, M., Bartko, W. T., Ridgely, M. S., Goldman, H. H., & Paulson, R. I. (1994). Local mental-health authorities and service system change: Evidence from the Robert-Wood-Johnson-program-on-chronic-mental-illness. *Milbank Quarterly, 72*, 49–80.
- Padgett, D. K., Gulcur, L., & Tsemberis, S. (2006). Housing first services for people who are homeless with co-occurring serious mental illness and substance abuse. *Research on Social Work Practice, 16*, 74–83.
- Pescosolido, B. A. (2006). Of pride and prejudice: The role of sociology and social networks in integrating the health sciences. *Journal of Health and Social Behavior, 47*, 189–208.
- Priebe, S., Matanov, A., Barros, H., Canavan, R., Gabor, E., Greacen, T., et al. (2012). Mental health-care provision for marginalized groups across Europe: Findings from the PROMO study. *European Journal of Public Health*. Retrieved February 7, 2012. doi:10.1093/eurpub/ckr214.
- Provan, K. G. (1997). Services integration for vulnerable populations: Lessons from community mental health. *Family & Community Health, 19*, 19–30.
- Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management, and effectiveness. *Journal of Public Administration Research and Theory, 18*, 229–252.
- Provan, K. G., & Milward, H. B. (1995). A preliminary theory of interorganizational network effectiveness—A comparative-study of 4 community mental-health systems. *Administrative Science Quarterly, 40*, 1–33.
- Provan, K. G., & Sebastian, J. G. (1998). Networks within networks: Service link overlap, organizational cliques, and network effectiveness. *Academy of Management Journal, 41*, 453–463.
- Provan, K. G., Milward, H. B., & Isett, K. R. (2002). Collaboration and integration of community-based health and human services in a nonprofit managed care system. *Health Care Management Review, 27*, 21–32.
- Provan, K. G., Fish, A., & Sydow, J. (2007). Interorganizational networks at the network level: A review of the empirical literature on whole networks. *Journal of Management, 33*, 479–516.
- Rosenheck, R. A., Lam, J., Morrissey, J. P., Calloway, M. O., Stolar, M., & Randolph, F. (2002). Service systems integration and outcomes for mentally ill homeless persons in the ACCESS program. *Psychiatric Services, 53*, 958–966.
- Rössler, W., Koch, U., Lauber, C., Hass, A. K., Altwegg, M., Ajdacic-Gross, V., et al. (2010). The mental health of female sex workers. *Acta Psychiatrica Scandinavica, 122*, 143–152.
- Scott, J. (2000). *Social network analysis: a handbook* (2nd ed.) London: SAGE Publications.
- Strandberg-Larsen, M., & Krasnik, A. (2009). Measurement of integrated healthcare delivery: A systematic review of methods and future research directions. *International Journal of Integrated Care, 9*. Retrieved February 23, 2009 from <http://www.ijic.org/index.php/ijic/article/view/305/608>.
- Strandh, M., Novo, M., & Hammarström, A. (2011). Mental health among the unemployed and the unemployment rate in the municipality. *European Journal of Public Health, 21*, 799–805.