

The personal social network of psychiatric service users

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Abstract

Background: For psychiatric service users, the personal social network offers resources such as behavioural guidance, social support, and coherence of care delivery. So far, most research on the subject has assessed the availability of these resources using size and composition measures. However, the availability of network resources also depends on the cohesion of the relationships between network members, a topic that is rarely addressed in the literature.

Aims: In this article, we aim to describe the cohesion of psychiatric service users' networks.

Method: We carried out a personal network survey and collected data on the social networks of 380 service users recruited in outpatient and inpatient services in Belgium. We used an ego-network mapping technique. The data were analysed using several structural metrics describing size, composition, and cohesion. We carried out analysis of variance (ANOVA) in relation to residential status, level of education, psychiatric history, and psychosocial functioning and analysed three cohesion indicators (density, fragmentation, and centralisation) with regression analyses.

Results: Personal social networks were small and not very cohesive. Most were composed of a dense subgroup as well as several isolated network members. The analyses revealed that highly educated psychiatric service users had more fragmented networks, while users living in independent accommodation had less dense networks. Density and fragmentation were not associated with the severity of psychosocial functioning, whereas centralisation was.

Conclusions: The low level of cohesion may indicate that service users aim to access multiple and diverse social resources and that better-off service users are more successful at doing so. On the whole, however, these personal social networks were fragile, because they contained a high number of isolated network members. Finally, it could be beneficial for professionals to pay special attention to the central persons within the networks of psychiatric service users.

Keywords

Social support, social network, personal network, ego network, cohesion

Introduction

The personal social network, that is, the set of a person's social ties and the web of relationships that link them (Perry et al., 2018), is of paramount importance for psychiatric service users. Social networks provide behavioural guidance through social comparison, explicit encouragement, and pressure and provide purpose and meaning in life through social roles and group inclusion. They provide emotional support and professional opportunities through both strong and long-lasting relationships and more distant relationships (Berkman et al., 2000; Cobb, 1976; Thoits, 1995). For psychiatric service users, social networks also facilitate access to health care resources, coping, and adaptation (Cobb, 1976; Sluzki, 2010). They influence the coherence of interventions by facilitating the circulation of information and by placing some support providers in a more central coordinating position and they help providers to offer care that is tailored to each individual's needs

(Bachrach, 1981; Digel et al., 2013; Haggerty et al., 2003). Their social networks also help service users to manage their own disorders and disabilities (Palumbo et al., 2015; Pinto, 2006; Sluzki, 2010).

So far, most research has assessed the availability of these resources for psychiatric services users according to the size and composition of social networks, on the assumption that it is beneficial to have more social

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contacts (Beels et al., 1984; Gayer-Anderson & Morgan, 2013). Regarding the size of a network, a larger social network has been associated with fewer negative symptoms (Degnan et al., 2018; Kawachi & Berkman, 2001; Santini et al., 2015), with a reduction in the number and duration of hospitalisations (Albert et al., 1998; Holmes-Eber & Riger, 1990; Lipton et al., 1981), and with better recovery attitudes and less internalised stigma (Cullen et al., 2017). Regarding the composition of a network, the presence of intimate relationships has been shown to have a positive effect on support (Fiori et al., 2006; N. Lin et al., 1999; Nelson et al., 1992). Being in contact with people who are medically trained fosters access to health services (Kadushin, 1966; Perry & Pescosolido, 2015). The diversity of a network can also be beneficial, as more diverse connections provide access to a wider range of information, experience, skills, and support.

The resources attached to a social network depend not only on size and composition, however, but also on the relationships between the members of a social network (S. Lin et al., 2019). For example, a consultant psychiatrist and a general practitioner who are in contact with each other are more likely to arrange effective hospitalisation in the event of a crisis. In this regard, the cohesion of a social network is one key resource to be taken into consideration. Network cohesion – defined as the propensity of members be connected to each other, which creates trust, mutual obligations, and a community of ideas – facilitate the flow of information and enable rapid and coordinated interventions (Dozier et al., 1987). A cohesive network could influence the user, facilitating behavioural acquisition and adherence to shared social norms (Berkman et al., 2000; House et al., 1988). In a fragmented network, however, the user is in contact with individuals or groups that are not connected to each other. Fragmentation favours access to a greater variety of social situations and social ties and, consequently, to a variety of resources. Furthermore, network fragmentation gives the user greater autonomy and limits external constraints, giving him or her the opportunity to take more responsibility for coordinating his or her own support system (Burt, 2004; Granovetter, 1973; Martí et al., 2017).

However, there have been relatively few studies on the cohesion of psychiatric service users' networks. The few studies that have been carried out have tended to focus on a limited number of indicators (mainly density). The most recent review of the literature on psychiatric service users' social networks (in this case devoted to early psychosis) found only three articles using cohesion measures (Gayer-Anderson & Morgan, 2013). Two other more recent reviews, one focusing on psychosis (Palumbo et al., 2015) and the other on chronic depression (Visentini et al., 2018), did not mention cohesion. It appears that higher density is associated with social network satisfaction (Corrigan & Phelan, 2004; Wong et al., 2011), although there seems to be no association with social support (Gayer-Anderson &

Morgan, 2013). In terms of service use, high density has been associated with seeking help and maintaining contact (Carpentier & White, 2002), but moderate density has been associated with fewer days of psychiatric hospitalisation (Dozier et al., 1987), density does not appear to be associated with numbers of hospitalisations (Lipton et al., 1981). Finally, moderate density has also been associated with fewer psychiatric symptoms (Goldberg et al., 2003). The studies available on the subject are limited and their inconsistency makes it difficult to draw any conclusions.

Network cohesion is an important dimension of the social network of psychiatric service users – one that is currently little studied or that has only been studied using a limited number of indicators. This is why we aim to describe, in this article, the cohesion of the social network using a wide variety of indicators and identifying the socio-demographic and clinical factors that influence the features of a network, taking into account the fact that service users' social networks are likely to vary according to their socio-demographic characteristics and clinical status (Eklund & Hansson, 2007).

Method

Design

Inspired by recent developments in ego-network surveys in the field of human services (Borgatti et al., 2009; Crossley et al., 2015; Perry et al., 2018), we developed a cross-sectional ego-network survey, using the sociogram technique (Hogan et al., 2007) and a two-stage name generator (Bidart & Charbonneau, 2011). We combined a broad question ('who are the people who support you?') with an exploration of the support obtained in four specific areas: finances, housing, activities, and health. The respondent then placed each supporter on Hogan's bullseye map and drew links between people to identify those whom he or she believed exchanged information ('who exchanges information about you?'). The information exchanged could, for example, be medical information exchanged between health professionals or information exchanged between family and health professionals that facilitates coordination.

We conducted this survey in Belgium with 380 service users with severe mental illnesses (Ruggeri et al., 2000; Schinnar et al., 1990), a group of service users who were at risk of rehospitalisation (Adair et al., 2005; Wiersma, 2006). The study was carried out in three Belgian districts of 250,000 inhabitants each. The full survey and sampling design has been presented elsewhere (Wyngaerden et al., 2019).

Measures

We computed several indicators describing size, composition, and cohesion. All indicators have been calculated with the R Igraph and Egor packages. These indicators are presented and explained in Table 1. We calculated the size of the network

and several indicators of composition. Network cohesion was measured using density and fragmentation indicators. Several indicators calculated from the presence in the networks of components, cliques, and isolates were also calculated: the size of the largest component, the percentage of alters (network members supporting a service user) in the largest component, the size of the largest clique, the average size of components, and the number of cliques of maximum size. A centralised network is another way to foster cohesion with a small number of key alters but with more connections. We computed the degree centralisation and the betweenness centralisation (Freeman et al., 1979). Finally, homophily is another indicator of cohesion in relation to the attributes of the node: it indicates how likely information flows within (homophily) different groups of alters (professionals, relatives, type of services, etc.) or between (heterophily) different groups of alters. To assess homophily within a group, we used the EI Index (Krackhardt & Stern, 1988).

Social networks may differ between socio-demographic groups and according to clinical status. We therefore described the networks according to user socio-demographics and clinical status. For socio-demographics, we considered residential status and level of education (Bidart et al., 2018). For clinical status, we considered first contact with an in- or outpatient psychiatric service and psychosocial functioning (Health of the Nation Outcome Scales (HoNOS)) (Wing et al., 1998). All data were collected from service users, with the exception of HoNOS, which was completed by a professional. Each user designated a professional who knew him or her well so that they could fill in the scale (Wyngaerden et al., 2019).

Analysis

We carried out an analysis of variance (ANOVA) of the different characteristics of the service users' networks described above in relation to four variables that were likely to affect network cohesion: residential status, level of education, severity of psychosocial functioning, and length of psychiatric history. We then carried out linear regression analyses of three network characteristics that we regressed on socio-demographic and personal characteristics of the service users mentioned above. These three network characteristics were selected because they had low to moderate correlations with each other and captured different aspects of network cohesion: density (a widely used measure of interconnection between alters), number of components (as a source of diversity of resources provided by the network) and centralisation (as cohesion is also created by the coordinating role of a limited number of highly connected alters).

Results

The psychiatric service users we met were, on average, 45.4 years old ($SD=11.6$) and just under half were women.

Half of our sample had independent living arrangements and 22% had completed higher education. Service users had, on average, 14 years of psychiatric history, during which they had been hospitalised an average of 7 times (see Table 1). They had a moderate score of 11.6/48 on the HoNOS scale (proxy for psychosocial functioning). A third of them had substance use problems and 40% suffered from hallucinations and delusions (Tables 2 and 3).

On average, users had a small network (12), composed mainly of professionals (7.5). Most of the professionals (5.3) were from mental health services and most of the non-professionals were family members (2.8). The average network was not very cohesive: density and centralisation were low, while fragmentation was high. Only 22% of all pairs of alters were directly connected to each other (density) and 65% of them were not connected to each other either directly or indirectly (fragmentation).

The average network was composed of a relatively large and dense subgroup and several isolated alters. The networks had an average of 5.3 components (subnetworks that were completely disconnected from each other), but only 1.8 components were made up of several alters (3.5 components were made up of a single alter). The largest component averaged 6.4 alters and comprised 53.7% of all alters.

Figure 1 illustrates a typical ego network. This network (the service user is not represented) contained 12 alters, most of which were professionals who worked in mental health services. Its overall density is quite low (21%) and its fragmentation (57%) is due to the high number of isolates (4). This service user has one single component (excluding isolates) of 8 alters that are highly connected with each other and 66% of the alters are in this component.

The variance analysis indicated that network size and composition were associated with socio-demographic measurements. Living in the community and having a higher level of education were associated with more diverse networks, with fewer mental health professionals, and with more non-professionals. A community-oriented residential status was associated with fewer mental health professionals (F -test=58.4; $p<.0001$) but with more general health services (F -test=31.5; $p<.0001$) and more non-professionals (F -test=3.09; $p=0.03$). A higher level of education was associated with more generic services (F -test=4.4; $p<.0001$) and more friends (F -test=7.25; $p<.0001$). Regarding the diversity of a network, living in the community was associated with more types of services in the network (F -test=22; $p<.0001$) and with a greater diversity of the five categories of alters (mental health, health, social services, justice, generic services, and non-professionals) (F -test=8.7; $p<.0001$). This was also the case for level of education (F -test=4.8; $p<.0001$ – F -test=4.8; $p<.0001$) (Tables 4 and 5).

Density and fragmentation were both associated with residential status (F -test=15.3; $p<.0001$ – F -test=10.7; $p<.0001$) and with level of education (F -test=3.8; $p=0.01$ – F -test=4.9; $p<.0001$), but in opposite ways.

Table 1. Definition of the main measures used to describe the social networks collected, in terms of size, composition, and cohesion, Morpheus Study, Belgium 2014–2015.

	Definition
Size and composition measures	
Network size	Number of alters (network members) supporting ego (the focal service user)
Diversity of professional services	Number of different professional services (community mental health teams, psychiatric wards, sheltered housing, etc.) to which the alters supporting ego are attached
Diversity of professional functions	Number of different professional functions (psychiatrist, nurse, social worker, etc.) among the alters supporting ego
Diversity of types of alters	Number of types of alters (mental health services, health services, social services, justice, generic services, and non-professionals) among the alters supporting ego
Cohesion measures	
Density	Proportion of effective ties among all possible ties between alters
Fragmentation	Proportion of pairs of alters that are not connected to each other directly or indirectly
Component	Subset of alters that is disconnected from other subsets in ego's network
Clique	Subset of alters that are all connected to each other (maximum density subnetwork)
Isolates	Alter which is not in contact with any other alter in ego's network
Degree centrality	Number of other alters with which an alter is in contact within ego's network
Degree centralization	Sum of the differences in degree centrality between the most central alter and the others, divided by the largest sum of differences that can exist in a network of the same size
Betweenness centrality	Number of times an alter is a crossing point along the shortest path between two other alters
Betweenness centralisation	Sum of the differences in betweenness centrality between the most central alter and the others, divided by the largest sum of differences that can exist in a network of the same size
Average degree	Average number of other alters with which all ego's alters are in contact
Homophily	Number of links between different alters (according to a specific characteristic) minus the number of links between similar alters, divided by the total number of alters (range from -1 to 1)

Table 2. Clinical features and socio-demographic characteristics of severely mentally ill users of psychiatric services, Morpheus Study, Belgium 2014–2015: M and SD ($n = 380$).

	M or %	SD
Clinical features		
Health and social functioning (HoNOS, score 0 to 48)	11.6	6.7
Use of drugs or alcohol (%)	35.0	
Hallucinations or delusions (%)	40.0	
Depressed mood (%)	82.0	
Anxiety (%)	34.0	
Duration of psychiatric path (number of years)	14.4	14.2
Number of hospitalizations	7.0	6.5
Socio-demographic characteristics		
Social integration (SIX, score 0 to 6)	2.3	1.43
Elementary school or less (%)	15.8	
Lower secondary education (%)	31.0	
Upper secondary education (%)	31.3	
Higher education (%)	21.9	
Living in 24-hour supervised institution (%)	29.4	
Living in sheltered housing (%)	19.2	
Living in individual housing (%)	26.8	
Living as a member of a couple or family (%)	24.7	
Female (%)	47.0	
Age (years)	45.4	11.6
Belgian nationality (%)	90.0	

Density was higher among service users living in the community or who had a higher level of education. The opposite was true for fragmentation. Betweenness centralisation varied according to level of education (F -test = 4.6 $p < .0001$).

We also examined whether the characteristics of the networks varied according to clinical status (see Supplementary Tables 1 and 2). There were few significant results. The number of non-professionals decreased with greater severity of psychosocial functioning (F -test = 3.4; $p = .03$). The betweenness centralisation shows a small but very significant variation in the averages of the three categories of severity (F -test = 4.7; $p < .0001$). The size of the network (F -test = 3.1; $p = .046$) increased with a longer psychiatric history. The other associations that were identified did not have a clear direction.

We have also carried out linear regression analyses of three network characteristics that we regressed on socio-demographic and personal characteristics, controlled for age and gender. The socio-demographic and personal characteristics are all included in all three different models, corresponding to the three network characteristics. In the first model (density), lower level of education and living in a supervised institution were associated with higher density. Service users with a lower level of education and people living in a 24-hour supervised institution had a lower number of components (Model 2). This was also the case in Model 3: betweenness had a $\cap$ -shape relationship with the severity of psychosocial functioning: the highest value

Table 3. Structure of social support networks of severely mentally ill service users, Morpheus Study, Belgium 2014–2015: M and SD ($n = 380$).

	M	SD
Size and composition measures		
Support persons (no.) (i.e. network size)	12.1	5.2
Professionals (no.)	7.5	3.5
Mental health services (no.)	5.3	3.2
Health services (no.)	0.9	1.0
Social services (no.)	0.9	1.1
Justice (no.)	0.1	0.3
Generic services (no.)	0.2	0.7
Nonprofessionals (no.)	4.6	3.2
Diversity of professional services (no.)	3.9	1.9
Diversity of professional functions (no.)	5.8	2.0
Diversity of types of alters ^a (no.)	3.4	0.9
Cohesion measures		
Density (%)	22.2	17.9
Fragmentation (%)	65.3	27.0
Components (no.)	5.3	3.0
Components (excluding isolates) (no.)	1.8	1.1
Cliques of maximum size (no.)	1.6	1.5
Isolates (no.)	3.5	2.8
Size of the largest component (no.)	6.4	3.6
Alters in largest component (%)	53.7	23.1
Size of the largest clique (no.)	4.3	2.5
Average size of component (no.)	2.9	2.2
Cliques of maximum size (no.)	1.6	1.4
Degree centralization (%)	22.6	12.0
Betweenness centralization (%)	11.3	14.8
Average degree (no.)	2.3	2.0
Homophily between professionals and non-professionals (ranges from -1 to 1)	-0.3	0.8
Homophily between types of alters ^a (ranges from -1 to 1)	0.2	0.7

^aThe types of alters used here are: professionals from mental health services, health services, social services, justice, generic services, and non-professionals.

for centralisation was for users with an intermediate level of psychosocial functioning. However, severity of psychosocial functioning, psychiatric history, gender, and age showed no correlation with density and the number of components (Table 6).

Discussion

The social networks of these psychiatric service users were, on average, small; they contained a majority of professionals and were not very cohesive. They had low density and low centralisation and were highly fragmented. But these users also had, on average, a large and cohesive subgroup that was disconnected from several isolated alters. This suggests that fragmentation is mainly based on a large set of isolated alters, rather than on several disconnected subgroups. Cohesion, in fact, remains important,

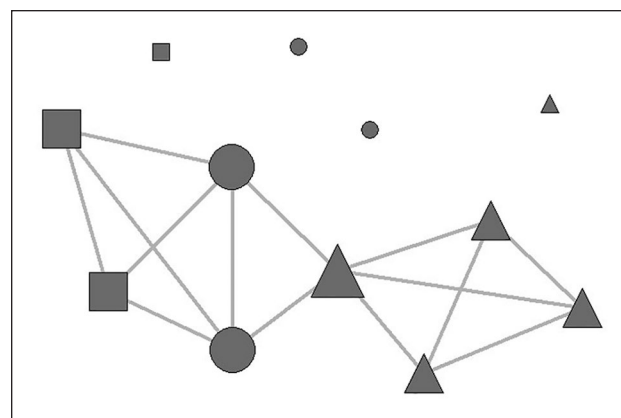


Figure 1. A typical personal social network of a psychiatric service user, Morpheus Study, Belgium 2014–2015. Points: support persons cited by the user (alters). Point size: number of ties with other alters (degree). Shape of points: round: mental health services; square: health services; triangle: non-professionals. Lines: ties of information exchange relationships between alters cited by the user.

but within a subgroup of the network rather than within the network as a whole.

This general pattern, however, differed according to educational level and living arrangements. Highly educated psychiatric service users had more fragmented networks, while users living in independent accommodation had networks that were less dense. The high density of the networks of people living in supervised housing can be explained by the large team of professionals who interact with each other in this context. The higher fragmentation and the higher number of components in the networks of those with higher educational levels deserve some attention. Fragmentation provides access to a greater diversity of sources of support and greater autonomy for the user in coordinating his or her own network (Burt, 2004, 2009; Granovetter, 1973). More highly educated people may have access to a more diverse set of social resources (Bidart et al., 2018). More highly educated users may also require less coordination between alters, as they may be less socially vulnerable and may thus be better placed to navigate the mental health care system.

Density and fragmentation were not associated with the severity of psychosocial functioning, whereas centralisation was. However, another study has argued that people with poorer cognitive and functional health are less able to maintain a more fragmented and therefore more energy-consuming network (Cornwell, 2009). In the field of mental health, coordination between professionals is partly responsible for the structure of the support network; these results might suggest that the organisation of the support network around users is not consistently based on users' clinical status (i.e., the severity of psychosocial functioning). This is consistent with another study (conducted in the same geographical area) that showed that client-centred orientation was the factor that contributed least to the quality of professional collaboration (Nicaise et al., 2020).

Table 4. Structure of social networks of severely mentally ill service users according to their residential status, Morpheus Study, Belgium 2014–2015 ($n = 380$).

	24-hour supervised institution	Sheltered housing	Individual independent housing	Independent housing as a member of a couple or family	F value
Size and composition measures					
Support persons (no.) (i.e. network size)	12.7	12.1	11.8	11.7	0.7
Professionals (no.)	8.7	7.7	6.8	6.6	8.6***
Mental health services (no.)	8.1	6.1	4.8	4.6	58.4***
Health services (no.)	0.3	1.1	1.2	1.3	31.5***
Social services (no.)	0.9	0.9	1.2	0.9	0.5
Justice (no.)	0.1	0.1	0.1	0.1	0.7
Generic services (no.)	0.2	0.3	0.3	0.3	0.9
Non-professionals (no.)	4.0	4.3	5.1	5.1	3.1*
Family members (no.)	2.5	2.1	2.9	3.4	4.4**
Friends (no.)	0.8	1.3	1.7	1.1	6.6**
Diversity of professional services (no.)	2.7	4.4	4.4	4.3	6.6***
Diversity of professional functions (no.)	6.5	6.1	5.4	5.2	8.7***
Diversity of types of alters ^a (no.)	3.0	3.6	3.5	3.6	14.5***
Cohesion measures					
Density (%)	0.3	0.2	0.2	0.2	15.3***
Fragmentation (%)	0.5	0.7	0.7	0.7	10.7***
Components (no.)	4.7	5.5	5.7	5.6	2.8*
Components (excluding isolates) (no.)	1.7	1.8	2	1.7	1.7
Cliques of maximum size (no.)	1.7	1.8	1.6	1.5	0.7
Isolates (no.)	3.0	3.7	3.8	3.9	2.1
Size of the largest component (no.)	7.8	6.1	5.6	5.7	9***
Alters in largest component (%)	0.6	0.5	0.5	0.5	9.7***
Size of the largest clique (no.)	5.7	4.0	3.7	3.7	16.5
Average size of component (no.)	3.8	2.6	2.5	2.6	8.8***
Cliques of maximum size (no.)	1.7	1.8	1.6	1.5	0.7
Degree centralization (%)	0.2	0.2	0.2	0.2	0.8
Betweenness centralization (%)	0.1	0.1	0.1	0.1	0.8
Average degree (no.)	3.4	2.0	1.7	1.8	20.5***
Homophily between professionals and non-professionals (ranges from -1 to 1)	-0.2	-0.4	-0.3	-0.2	1.4
Homophily between types of alters ^a (ranges from -1 to 1)	0.3	0.3	0.1	0.1	2.8*

^aThe types of alters used here are: professionals from mental health services, health services, social services, Justice, generic services, and non-professionals.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Individuals with moderate severity were more likely to have higher betweenness centralisation. One possible explanation for this is that it is easier to increase centralisation since it involves diversifying the relationships of one alter, whereas increasing density would involve a higher number of alters. In addition, the HoNOS, the scale used to measure the severity of psychosocial functioning, uses a relatively limited time window (2 weeks) to assess severity (Wing et al., 1998). It is possible that in such a short period of time only the position of a limited number of alters within the network may be modified.

Consistency with previous studies

The size of psychiatric service users' networks documented in the literature is consistent with what we found.

In previous studies, in which the size varied from 3 (Holmes-Eber & Riger, 1990) to 25 (Koenders et al., 2017), with an average of 13 (Albert et al., 1998; Goldberg et al., 2003; Palumbo et al., 2015; Sweet et al., 2018; Wong et al., 2011), depending on the collection methods used. In the literature, however, the percentage of professionals is usually much lower (Corrigan & Phelan, 2004; Wong et al., 2011). Other studies have found that mental health professionals made up 20% (Meeks & Murrell, 1994), 17% (Holmes-Eber & Riger, 1990), or even 1.7% (Carpentier & White, 2002) of networks. The difference may be due to name-generators that emphasise either professional or informal resources. The average density of the networks collected in this study is also different from that in the literature. Density in our networks was lower than in previous studies. Most studies report a density of between

Table 5. Structure of social networks of severely mentally ill users of psychiatric services according to their level of education, Morpheus Study, Belgium 2014–2015 ($n = 380$).

	Elementary school or less	Lower secondary education	Upper secondary education	Higher education	F value
Size and composition measures					
Support persons (no.) (i.e. network size)	10.6	12.2	12.0	13.0	2.3
Professionals (no.)	6.6	7.9	7.5	7.5	1.7
Mental health services (no.)	5.3	6.5	6.2	5.5	3.8
Health services (no.)	0.8	0.9	1	1.1	1.2
Social services (no.)	1.0	0.9	0.7	1.0	1.1
Justice (no.)	0.1	0.1	0.1	0.1	1.8
Generic services (no.)	0.1	0.2	0.2	0.5	4.4***
Non-professionals (no.)	4.0	4.3	4.5	5.5	3.1*
Family members (no.)	2.6	2.6	2.8	2.9	0.3
Friends (no.)	0.9	1.1	1.1	1.9	7.2
Diversity of professional services (no.)	3.5	3.6	3.8	4.5	4.8***
Diversity of professional functions (no.)	5.2	6.0	5.8	5.7	2.0
Diversity of types of alters ^a (no.)	3.3	3.2	3.3	3.7	4.8***
Cohesion measures					
Density (%)	0.2	0.2	0.2	0.2	3.8*
Fragmentation (%)	0.5	0.6	0.7	0.7	4.9***
Components (no.)	4.3	5.0	5.4	6.3	6.1***
Components (excluding isolates) (no.)	1.6	1.8	1.9	1.8	0.8
Isolates (no.)	2.6	3.2	3.5	4.6	6.1***
Size of the largest component (no.)	4	4.6	4.6	4	1.4
Alters in largest component (%)	0.6	0.6	0.5	0.5	4***
Size of the largest clique (no.)	3.9	4.6	4.6	4.1	1.4
Average size of component (no.)	3.7	3.3	2.7	2.4	4.9***
Cliques of maximum size (no.)	1.8	1.8	1.5	1.6	0.8
Degree centralization (%)	0.3	0.2	0.2	0.2	2.7
Betweenness centralization (%)	0.2	0.1	0.1	0.1	4.6***
Average degree (no.)	2.3	2.6	2.4	1.9	1.9
Homophily between professionals and non-professionals (ranges from -1 to 1)	-0.2	-0.3	-0.4	-0.2	1.7
Homophily between types of alters ^a (ranges from -1 to 1)	0.3	0.2	0.1	0.2	0.7

^aThe types of alters used here are professionals from mental health services, health services, social services, Justice, generic services, and non-professionals.

* $p < .05$; ** $p < .01$; *** $p < .001$.

50% and 60% (Dozier et al., 1987; Goldberg et al., 2003; Horan et al., 2006). This could be related to the context in which service users were encountered: a health system that focuses heavily on professional support and psychiatric hospitals (rather than community resources) and in which collaboration is problematic at different levels (between hospital and ambulatory services, general services and specialised services, etc.) (Nicaise et al., 2013). This may imply that a move towards community care is required, not only to avoid institutionalisation within psychiatric hospitals, but also to avoid the institutionalisation of social networks.

How do our results compare with previous typologies of personal social networks within the general population? In a recent study, Bidart and colleagues (2018) proposed a

typology of social networks based on their structural characteristics. The average network we found was similar to Bidart's 'dispersed' type of network. The type of network described by Bidart et al., like our average network, has a low centralisation (evaluated by betweenness in Bidart's model), high fragmentation (modularity in Bidart's model), and low density. In this type of network, few relationships are developed between alters, due to the ego dissociating its relationships into individuals or small groups (Bidart et al., 2018). In Bidart's study, more dispersed networks were associated with the highest levels of education and with living alone. According to Bidart et al.'s (2018) interpretation, this implies that the people with the most resources have a broader and more diversified social environment. This is consistent with our results, which show that the most

Table 6. Linear regression analysis of three network characteristics on socio-demographic and personal characteristics of the users, Morpheus Study, Belgium 2014–2015 ($n = 380$): average marginal effects (AME).

	Model 1: Network density (average marginal effect) ^a		Model 2: Number of components (average marginal effect) ^a		Model 3: Betweenness centralization (average marginal effect) ^a	
	AME (SE)	T-Value	AME (SE)	T-Value	AME (SE)	T-Value
Level of education						
Elementary school or less	23.95 (2.44)	2.14*	4.37 (0.4)	−3.84***	16.14 (2.05)	1.89
Lower secondary education	24.21 (1.73)	2.60**	4.98 (0.28)	−3.15**	10.4 (1.45)	−0.27
Upper secondary education	22.45 (1.73)	2.01*	6.43 (0.29)	−2.18*	8.85 (1.45)	−0.96
Higher education	17.03 (2.09)		6.43 (0.35)		11.02 (1.76)	
Residential status						
24-hour supervised institution	31.98 (1.84)	4.61***	4.62 (0.30)	−2.29*	13.31 (1.54)	0.91
Sheltered housing	17.54 (2.21)	0.5	5.53 (0.37)	−0.3	10.09 (1.85)	−0.42
Individual independent housing	19.07 (1.87)	0	5.41 (0.31)	−0.6	11.86 (1.57)	0.3
Independent housing as a member of couple or family	19.07 (2.08)		5.68 (0.34)		11.17 (1.74)	
Severity of psychosocial functioning						
HoNOS score below 11	21.63 (1.7)	0.61	5.73 (0.28)	0.77	9.77 (1.43)	0.07
HoNOS score between 11 and 17	23.93 (1.71)	1.59	4.78 (0.28)	−1.64	15.4 (1.43)	2.92**
HoNOS score higher than 17	20.18 (1.68)		5.42 (0.28)		9.63 (1.42)	
Time since first contact with psychiatry						
Less than 5 years	22.42 (1.56)	0.5	5.27 (0.26)	−0.47	11.75 (1.31)	0.01
Between 5 and 15 years	22.05 (1.86)	0.3	5.2 (0.31)	−0.6	11.33 (1.56)	−0.18
More than 15 years	21.27 (1.73)		5.45 (0.29)		11.73 (1.45)	

AME: average marginal effects; HoNOS: Health of the Nation Outcome Scales.

^aAll three models include all variables in the table, controlled for age and gender.

* $p < .05$; ** $p < .01$; *** $p < .001$.

fragmented networks are those of service users living in the community who have a high level of education. However, Bidart's 'dispersed network' type had many components made up of more than one alter, whereas our average network contained one such component and had a large number of isolates. This may be due to the smaller size of our networks and the lower diversity of the network members in our population. It also implies, however, as mentioned above, that fragmentation is related to a high number of isolates. Without these isolates, the networks of psychiatric service users would be denser and would thus correspond to a centred or dense type of network, which Bidart associated with less privileged people.

Limits

In Belgium, the only source of information available to describe psychiatric service users' social networks and their use of services is the service users themselves. There is no centralised information system. Given that service users with severe mental disorders may suffer from delusions and hallucinations, it is possible that the data we have collected is inaccurate. This should, however, have a limited impact on our findings. We have met many service users who have expressed delusional ideas. Only one user, however, mentioned a character from their delusions on the sociogram as

someone who supports them. It seems to us that the collection device itself keeps delusions at bay because the questions are rooted in practical aspects of the person's life. It is also possible that users forgot to mention certain alters or were unaware of some exchanges between alters, while overestimating other exchanges. Exchanges between professionals all require the consent of the user, but that may not always be how things happen in practice. Elsewhere (Wyngaerden et al., 2019), Kappa coefficients indicated quite a good level of agreement between users' reports and main clinicians' reports of users' social support networks. Other studies, moreover, have shown such collection methods to be reliable. According to Green et al. (2013) information about alters is accurately reported by the ego. Another study showed an 80% agreement between different egos about the same alter–alter social ties (Adams & Moody, 2007).

Another limitation is related to the cross-sectional design, which is vulnerable to reversed causation and unobserved confounders (e.g., the relationship with the health professional who propose to the user to participate in the study). We were also interested in describing the cohesion of relationships within service users' networks. We did not take the content of those relationships into consideration, although it could also have a significant impact. Finally, the sample of users interviewed is not representative of the population of service users with severe mental disorders. It

seems to us, however, that our samples correspond quite well to the Belgian population of service users suffering from severe mental disorders. The average HoNOS score in our sample is quite close to that found in another Belgian study of a similar population (respectively 11.6, $SD=6.5$ and 12.5, $SD=6.5$) (Lorant et al., 2017).

In conclusion, our study highlights the variety of size, composition, and structure indicators that can be used to describe the social networks of service users with severe mental disorders. We have shown that a variety of cohesion indicators can allow us to give a more nuanced picture of the social networks of service users than if we limit ourselves to size or composition. This picture can be useful for decision-makers, service users, and professionals alike. For decision-makers, the significant professionalisation of users' networks suggests that 60% of users' networks are, in some way, funded by public money, even for people with a higher level of education. Moreover, this professionalisation is likely to increase, given the structural weakness of the networks, which are dense, offer little diversity of resources, and are made up of isolated people with whom it is difficult to coordinate. From the users' point of view, the limited number of components indicates that users participate in a limited number of social circles and therefore have limited social roles (Burt, 2004, 2005; Dozier et al., 1987; Granovetter, 1973). This is important information for professionals, both in the development of social support programmes (Sheridan et al., 2018) and in relation to the support provided by Assertive Community Treatment teams. The association between centralisation and the severity of psychosocial functioning should also be of interest to professionals, as it points to the importance of developing the central role of a professional, for example, in case management. It would be useful if professionals could describe the networks of the users they support using the measurements used here and act accordingly. All this highlights the value of developing research that uses cohesion measurements in association with composition measurements in an effort to understand in more detail what social networks offer users and to provide support that could enable them to live meaningful lives in the community.

Conflict of interest

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Supplemental material

Supplemental material for this article is available online.

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