

European mental health research resources: Picture and recommendations of the ROAMER project

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<https://doi.org/10.1016/j.euroneuro.2018.11.1111>

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Received 16 March 2018; received in revised form 13 November 2018; accepted 15 November 2018

KEYWORDS

Mental health research;
Research resources;
Research on research

Abstract

As part of the Roamer project, we sought to have a picture of the available mental health research (MHR) funding, capacity-building and infrastructures resources and to establish consensus-based recommendations that would allow an increase of European MHR resources and enable better use and accessibility to them. The methods fell into three sections (i) a review of the literature, (ii) a mental health-related keywords search within the Cordis[®], On-Course[®] and Meril[®] databases which contain information on European research funding, training and infrastructures. These reviews provided an overview that was presented to (iii) two experts workshops with 28 participants drawn from academic which identified gaps and produced recommendations. The literature review illustrates the debates in the scientific community on funding, training and infrastructures. The database searches estimated the fraction of health research resources available for mental health. Eight overarching goals for MHR resources were identified by the workshops; each of them was carried out with several practical recommendations. Resources for MHR are scarce considering the burden of mental disorders, the high rate of return of MHR and the under-investment of the field. The recommendations are urgently warranted to increase resources and their optimal access and use.

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1. Introduction

The burden of mental disorders and self-harm in Europe is considerable, accounting for 11% of all-cause disability adjusted life years (DALYs) i.e., 22% of years lived with disability (YLD) and 5% of years of life lost (YLL) (WHO, 2017). In fact, this is likely to be a substantial underestimate, mainly due to the omission of the impact of avoidable comorbidities linked to psychiatric disorders (Charlson et al., 2015; Patel et al., 2016; Walker et al., 2015; Ferrari et al., 2014; Vigo et al., 2016). In comparison, the share of health research funding dedicated to mental health in EU FP7 program is only 5% (Hazo et al., 2016) and between 4 and 10% at the national level in the UK, France, Spain and Finland in 2011 (Hazo et al., 2017).

The Roamer project was set up to produce a roadmap for mental health research (MHR) that would produce feasible research questions and suggest a way forward for Europe. The consensus method has been described in detail (Haro et al., 2014). This is the largest such process involving more than 1000 scientists, clinical professionals, and families including those with experience of mental ill health for the first time (Fiorillo et al., 2013). The process resulted in a comprehensive consensus-based Roadmap (Belli et al., 2015) and a short-list of MHR priorities for the next decade (Wykes et al., 2015).

Work package 3 (WP3) of ROAMER investigated the resources necessary to implement the research priorities. There were three “areas of knowledge” covered: capacity and infrastructure, training and capacity building, and fund-

ing. Capacity and infrastructures not only included the research units, institutes and networks necessary to perform research but also the technical infrastructures that would be essential such as databases, cohorts, biobanks, computing or biological analytical facilities. Research training and capacity building engenders building a workforce capable to perform the research tasks, and finally we considered public financial resources available for mental health research.

2. Aims of the study

To participate to the Roamer’s aim of improving MHR in Europe, our first objective was to establish a picture of MHR resources. The second objective was to identify the main gaps and advances needed in the three areas of knowledge through an expert panel. The final objective was to establish, in a consensus-based manner, a list of specific recommendations that would allow a better utilization and accessibility of MHR resources.

3. Experimental procedures

The method was divided into three parts: a literature review, database searches and two workshops.

3.1. Part 1 - Literature review

We searched separately the three following domains in the PubMed and PsycINFO databases: research infrastructures

(RI), capacity-building or training, and funding in relation with mental health (or psychiatric) research. This literature review had two steps, using the same research strategy. The first step was performed in 2012 covering the years 2002-2012 and aimed at building the focus groups discussion guide. The second step was performed in 2018 covering the 2012-2017 period with the aim to update the data and to capture possible evolutions in the literature covering our topics of interest.

The objective was to get an overview on scientific research and opinion papers covering the human, infrastructural and financial resources of mental health research. It looked at answering to the following research question: “what are the scientific works and claims focusing on mental health research resources?”

All kind of original research and opinion papers (including editorials and commentaries) published in peer-review revues were included in our review. Articles were included if the abstracts were published in English and articles were published in English, French or German, between January 2002 and December 2017. Articles were retained as relevant if they focused on some aspects of mental health research infrastructures, capacity building (or training) or funding. The mental health field of ROAMER includes all entries of chapter V of the ICD-10 with the exception of mental disabilities, nicotine addiction and dementia. Articles were excluded if they were related to a specific disease, service, population or treatment unless they included some element relating to mental health research. Articles focussed on research in low and middle-income countries outside Europe or on health research in general rather than MHR in particular were also excluded.

Articles were screened on the basis of their titles and abstracts. The selection process has been performed through PubMed and PsycINFO retrieval tables, exported to an Excel spreadsheet for duplicate elimination.

3.2. Part 2 - Searching of databases

Three databases were searched:

- (i) Meril[®] is an on-going mapping initiated by the European Foundation Association and supported successively by the FP7 and H2020 European Commission’s research programmes. It dynamically inventories European RIs. The last time we accessed the portal (Nov. 2017), 942 European RIs were referenced. We asked the Meril[®] team to send us the list of the programmes referenced as belonging to biomedical and social sciences domains ($n = 356$), we read their description and visited their websites in order to retrieve the ones potentially useful to mental health researchers or dedicated to them.
- (ii) On-Course[®] defines itself as “*an industry and academia led course portal that is the most comprehensive and insightful biomedical postgraduate education and training resource in Europe.*”, it is initiated and managed by EMTRAIN (European Medicines Research Training Network), part of the Innovative Medicines Initiative (IMI) and jointly funded by the European Commission and EFPIA (European Pharmaceutical Industries and Associations). Like Meril[®], it is an on-going inventory

with each programme classified by one or more biomedical disciplines from a list of 40. At the date at which we accessed the database (Nov. 2017) 8 426 European courses were inventoried: 3 636 masters, 3 632 short courses and 1 158 PhD from 33 European countries (including Israel) (Payton et al., 2013). We selected the training for which the course disciplines included “psychiatric disorders”. We then read the courses’ description to classify them between “not mental health related”, “partially linked to mental health” and “mental health dedicated”. We also screened the courses without any courses disciplines filled (missing data) and retrieved among them some courses related to mental health.

- (iii) Cordis[®] is the database inventorying all the EU-funded research projects. We extracted the 25,783 research projects funded by the European Commission’s Directorate for Innovation and Research between 2007 and 2013. Methods and results of this query have been published elsewhere (Hazo et al., 2016) and will not be displayed in detail in the present paper.

In these three databases we isolated the mental health related or dedicated elements in order to analyse them and compare them to the rest of the data.

3.3. Part 3 - Workshops

Two scientific workshops were held in September 2012 and February 2013, attended by 28 mental health researchers in total (26 at the first one and 20 at the second). All the experts had demonstrated expertise through their publications or organisational positions (e.g., in the European Psychiatric Association or OECD). Geographical region, gender and age distribution were considered in their selection. The list of participants is provided in the annex.

Quantitative data and preliminary findings of the literature review, organized by European and country levels, were presented at both workshops in order to provide a basis for discussion. We proceeded by area of knowledge, the presentations were followed by the reactions of each expert, then the discussions were oriented in order to enable the experts to reach consensus on gaps and advances needed in each of the areas of knowledge. The discussions were audio-recorded and noted by two researchers before being transcribed and organized by themes. After the first workshop, a synthesis of the exchanges was circulated for validation among the participating experts. Following the second workshop, a preliminary document was drafted with the exhaustive list of recommendations, structured by the areas of knowledge, main goals and changes needed. This document was circulated later to all workshop participants for final comments and validation.

4. Results

4.1. Literature review

In total, 992 papers were retrieved, 121 duplicates (from different databases and strategies) were removed, and 746

papers were not meeting inclusions criteria. 125 papers were retained as relevant and analysed.

25 of them were explicitly the writers' opinions, these papers were varied and perspective pieces from every area of knowledge, including editorials planning the future of psychiatric research, comments based on real-life experience in training young researchers and cultural competencies and debates on last MHR evolutions. There were arguments for common strategies, users involvement, more funding (especially from private not-for-profit sources), equitably shared between neurosciences and traditional psychiatric approaches, or demands for more capacity-building, multi-disciplinary approaches, collaborations with the pharma industry, and for a public health paradigm in mental health research as well as bridging the psychotherapeutic and pharmacological research (Nutt, 2005; Erickson and Erickson, 2007; Atkins and Frazier, 2011; Drake, 2013; Owen, 2014; Schachar and Ickowicz, 2014; Okkels et al., 2015; Fitzgerald, 2015; Caldieraro, 2016; Sweetland et al., 2016; Wessely and Nicholson, 2016; Lewis-Fernández et al., 2016; Bhui, 2016; Moss et al., 2016; Bhugra et al., 2017). Papers also made the cases for specific issues such as European psychotraumatology (Şar, 2015), women's and veteran women mental health (Blehar, 2006; Bastian et al., 2013), the development of qualitative research in psychiatry (Crabb and Chur-Hansen, 2009), the inclusion of minorities in research (Forsyth and Stoff, 2009; Jeste et al., 2009; Anand, 2012). Others discussed the relevance of impacts factors and peer-review systems in the field (Korkeila, 2007; Tennant et al., 2017) or of Research Domain Criteria (RDoC) (Sonuga-Barke, 2014).

Twelve articles were related to the infrastructure theme. Several describe formal partnerships with users, carers and practitioners (Drake et al., 2009; Minogue and Girdlestone, 2010; Horsfall et al., 2011; Staley et al., 2013; Cooper, 2017). Two articles were descriptions of new infrastructures or centres for improving MHR (Schmitt and Falkai, 2013; Carter et al., 2015). A paper investigated researchers-policymakers communication in mental health (Valentine et al., 2014), another tried to map the *mHealth* research strategies in mental health (Ben-Zeev et al., 2015). Two articles called for new infrastructures to provide MHR in specific fields including health services, minorities or disasters (Yanagihara et al., 2009; Pfefferbaum et al., 2010), and one presented the British mental health research landscape (Clark and Chilvers, 2005).

In the 36 articles retained as relevant for capacity-building and training, we found presentations of an inter-university Master's degree postgraduate programme in MHR (Rapado-Castro et al., 2015); strategies of global children MHR (Ordóñez and Collins, 2015) and proposed ethical conduct for a global MHR culturally responsible (Ruiz-Casares, 2014); positive impact on training of involving student nurse as research assistants (Davies et al., 2002); insights into short courses increasing MHR skills toward minorities (Hipolito et al., 2012), disasters related (Beaton et al., 2012) or dedicated to medical students (Cluver et al., 2014). A global mental health workforce presentation was made by NIMH authors (Collins and Pringle, 2016), along with call for collaboration with developing countries in psychiatric research (Doku and Mallett, 2003). We also found numerous studies about inclusion of users and carers in research set-

ting and training, and the needs for adapted training and mentoring strategies in that aim (Chene et al., 2005; DuBois et al., 2008; Chorpita and Mueller, 2008; Alegría, 2009; Flood, 2010; Alegría et al., 2011; Moltu et al., 2013; Thomas et al., 2014; Lincoln et al., 2015; Völlm et al., 2017; Horsfall et al., 2007), as well as positive evaluation of involvement of young people, users and community members in the design of online tools and research protocols in MHR (Mawn et al., 2016; Gammon et al., 2014); and the active role in research and advantages of psychiatric units located in general hospital (Bera et al., 2014). Several papers focused on collaboration in order to overcome racial disparities in psychiatric research (Laborde et al., 2007; Carpenter-Song and Whitley, 2013; Malik, 2013). Papers describe training programs such as geriatric mental health research (Bartels et al., 2010; Halpain et al., 2005), neuroimaging (Downar et al., 2010), recovery-oriented (Fisher, 2003), and qualitative methods for child and family disaster mental health research training (Maida et al., 2009). Two reviews concluded that research ethics should be increased during psychiatrists training (Beresin et al., 2003; Chen, 2003). Another literature review analysed the links between psychiatrists trainees and research (Fogel, 2009). The British human resources in forensic MHR were described in a paper (Soothill, 2010). Finally, a list of recommendations for MHR was made earlier by Thornicroft et al. (2002).

52 original articles on MHR funding were found. The RAND Corporation provides a mapping of the global MHR funding system and main actors (Pollitt et al., 2016). Several publications provided the share of health research funding dedicated to MHR in comparison with the share of burden of diseases occupied by mental disorders, sometimes comparing these indicators with others. They repeatedly showed discrepancies: first between the share of health funding dedicated to MHR in comparison with the share of total DALYs attributable to mental disorders, sometimes in comparison with such indicators in other nosographic fields (Chevreul et al., 2012; Christensen et al., 2011; Hazo et al., 2016; Hazo et al., 2017; Gandré et al., 2015; Kingdon, 2006; Kingdon and Wykes, 2013); and second discrepancies between groups of mental disorders' share of DALYs and funding attributed respectively (Batterham et al., 2016; Christensen et al., 2013; Jorm et al., 2002; Murray et al., 2017).

Although the published estimations of the impact of MHR are high (Hickie et al., 2005; Scott, 2005; Kelly et al., 2006; Guthrie et al., 2016; Henderson, 2002). An international bibliometric review of MHR showed that the share of MHR publications in the total medical publication output increased from 2.9% in 1980 to 5.4% in 2010, an increase assumed by the authors to be linked with the level of funding (Larivière et al., 2013). Papers showed the positive impact of involving users on MHR success, ethics and funding, (Ghisoni et al., 2017; Ennis and Wykes, 2013; DuBois et al., 2011; Griffiths et al., 2004; Headey et al., 2006; Links et al., 2016), and discuss combining symptoms scales for collaborating research (Lyne et al., 2012). Other papers covered specific aspects of MHR funding such as correlates of research output (Batterham et al., 2014), conflicts of interests in MHR (Henderson et al., 2003), media coverage of MHR and its impacts on funding (Lewison et al., 2012), definition of "policy impact of research" in MHR (Alla et al., 2017), presented and discussed of the RDoC

(Østergaard et al., 2014) or presented the NEURON network of European funding agencies (Dorlöchter and Lichtenberg, 2005). Papers discussed the formal and informal criteria of grants reviewers in mental health research (Cleary et al., 2006; Fischer and George, 2010). Articles partially covered funding of research by presenting research group (Cervilla et al., 2009), or studying specific countries psychiatric research (Falkai et al., 2013; Severinsson, 2012; Shalev, 2004).

Roamer's publications also arose, each Delphi study performed within the project resulting in calls for dedicated funding, especially within the H2020 EU funding program (Elfeddali et al., 2014; van der Feltz-Cornelis et al., 2014; Wykes et al., 2015) as well as in a similar roadmap for Canada (Davison et al., 2017), and Australia (McAllister et al., 2012). A translational behavioural model for research, integrating bio-psychosocial elements has been proposed (Wittchen et al., 2014a), and pursuing within the Roamer project (Wittchen et al., 2014b). The Mental Health Research Network (MHRN) presentation paper was also retrieved (Wykes and Marshall, 2004) along with its main perspectives (Wykes, 2004).

Specific papers discussed the relevance of research on population based registers in psychiatric research (Allebeck, 2009), and on bridging education and psychiatric research fields (Kataoka et al., 2009). Opportunities and barriers for correctional mental health research in the US were covered in an article (Appelbaum, 2008). A paper presented a partnerships between academic psychiatry and the Lilly company (Singh et al., 2004). Another one investigated attitudes of European patients with schizophrenia and depression toward psychiatric research (Schäfer et al., 2011).

4.2. Databases

Within the 8 627 biomedical courses registered in OnCourse®, 43.6% were located in the UK and 272 were classified as “psychiatric disorders”. Among these, 61 were excluded because they were not related to the mental health fields included in Roamer. Of the 211 after exclusions, 194 were dedicated to mental health and 17 were only partially related to mental health. We added six unclassified courses found manually giving a total of 217 mental health related courses. Courses retrieved as mental health related were classified by degree, by broad discipline (psychology, psychiatry or general mental health and/or mental disorders related), and by disorders when they were disorders specific. Results of these classifications can be found in Table 1.

Within the 356 European RI belonging to biomedical and social sciences “domains” in the Meril® database and located in Europe, we excluded 106 RI that were not useful to MHR. We found three RI that were mental health focused: the European Open-Access Publishing Platform for Psychology (PsychOpen), the Dutch TRAILS cohort and the Donders Institute for Brain, Cognition and Behaviour and eight RI dedicated to neurosciences research. Moreover 239 RI were considered as potentially useful to MHR as they could be used by mental health researchers although they were not dedicated to MHR.

Fig. 1 provides the distribution of the 250 RI dedicated or potentially useful to MHR by group of activities. Of the 250

RI useful or potentially useful to MHR, 47% were biological RI (118) providing support and services in genetics (35), analytical facilities (24), biobanks (20), animal models (7) and nanotech (5). 20% were either bibliographic tools (2) or data archives (48); 14% were dedicated to imagery services (36); 10% were dedicated to data computing (24) and 6% were cohorts (14). The remaining services provided (networks and clinical trials services) accounted for 1% to 2% of the RI inventoried in Meril®.

The Cordis® database search and results has been described in detail in a dedicated paper that describes the amount of research funding from European Commission between 2007 and 2013 (7th Framework Program) dedicated to MHR and by beneficiaries' country (Hazo et al., 2016). The main results of the study were that among the 25,783 research projects funded during the period, 215 (0.8%) were specifically dedicated to mental health and 170 (0.7%) were partially related to mental health. They received €607.1 million representing 1.4% of FP7 total funding. Within the subprogram dedicated to health research (Cooperation-Health), all the mental health related projects represented 5.2% of funding. Results also showed that EU research funding in 2010 dedicated twice as much funding in neurological and neurodegenerative research than in mental health while DALYs of mental disorders accounted for twice as much as the ones of neurological and neurodegenerative disorders.

4.3. Final recommendations

During the two steps process of the workshops, experts agreed on the main gaps, identified eight overarching goals to close the gaps linked to a list of 17 practical recommendations. An overview of these recommendations and goals is provided in Table 2 and they are summarized in Fig. 2. Here we also document each recommendation in the European context i.e.. gaps and needs, effectiveness, deliverability, feasibility and research strengths.

5. Resources and infrastructures

5.1. Goal 1: optimise European research strengths

Available European research infrastructures (RI), and among them European research databases, seem to be neither sufficiently known nor used by researchers. This leads to a waste of resources and loss of research opportunities. Due to differences in the collection, reporting, classification and languages, databases can be difficult to understand, use and compare across Europe. To improve the accessibility and the (e-)sharing of European clinical and research data, it is suggested to create an infrastructure which maps the available databases of population, clinical and research data in mental health (recommendation #1), and which promotes mental health disorders registries, mental health status surveys and the use of common indicators across countries (recommendation #2). Providing harmonised information about these databases (including owner, objectives, variables, method and language) would facilitate their dissemination

Table 1 Classification of mental health related courses inventoried in the On-Course® database.

	N	%
Total Biomedical Courses inventoried in On-Course®	8627	100%
Located in the UK	3759	43.6%
Related to mental health	217	2.5%
Dedicated to mental health	200	2.3%
Partially linked to mental health	17	0.2%
Located in the UK	170	78.3%
Short courses	16	7.4%
Masters	136	62.7%
PhD	26	12.0%
Masters and PhD	39	18.0%
Psychology related	137	63.1%
Mental disorders/mental health related	47	21.7%
Psychiatry related	17	7.8%
Disorder specific	51	23.5%
Mood disorders	19	8.8%
Psychosis	19	8.8%
Anxiety disorders	17	7.8%
Addiction disorders	13	6.0%
Autism	12	5.5%
ADHD and conduct disorders	8	3.7%
Eating disorders	6	2.8%
Personality disorders	6	2.8%

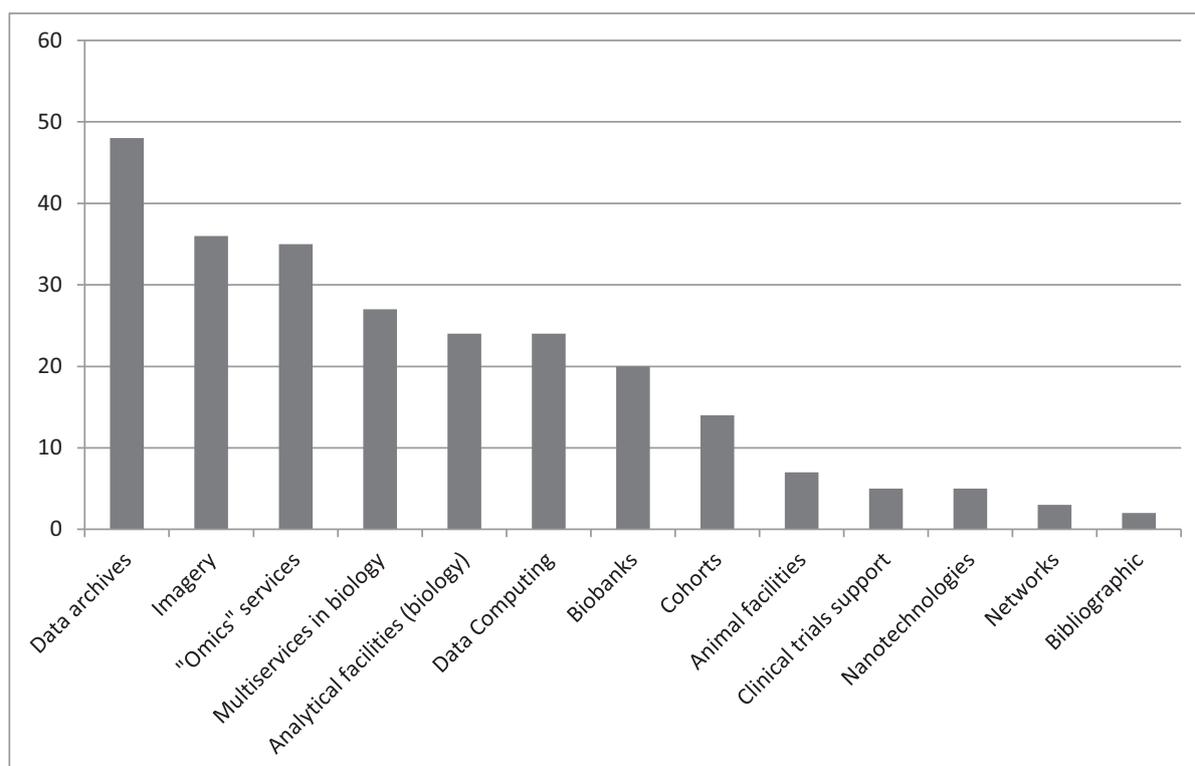
**Fig. 1** Number of RI potentially useful to MHR inventoried in Meril database, by service provided or activity ($n = 250$).

Table 2 List of goals and recommendations for MHR capacities and infrastructures, capacity-building and training, and funding.

Overarching goals	Advances needed
Optimize European research strengths	1. Create an infrastructure which maps the available databases of population, clinical and research data in mental health 2. Promote mental health disorders registries, mental health status surveys and the use of common indicators across countries 3. Implement open access to publicly-funded MHR publications 4. Implement open access for publicly-funded MHR data 5. Increase visibility, access to and use of research infrastructures
Encourage collaborative and multidisciplinary projects so as to create the 'critical mass' necessary	6. Increase the number, quality and efficiency of international and interdisciplinary networks 7. Develop knowledge exchange activities
Develop access to MHR training	8. Encourage and support the creation of European MHR courses and share available training resources
Close the gap between clinical practice and research	9. Provide basic research training to every health professional 10. Condition academic careers on the development of research skills
Increase the attractiveness of mental health research	11. Improve the 'employability' of researchers and bridge the academic and industrial sectors in order to offer variety and opportunities for research-oriented careers 12. Incorporate and/or promote MHR in related research training tracks (health promotion, prevention...)
Promote innovative, competitive and excellent research	13. Increase transparency in the development of calls for proposals and involve more researchers in the setting of research priorities 14. Create faster and more flexible funding mechanisms, especially in the short term 15. Increase the proportion of core funding and/or develop long-term calls
Improve efficiency of MHR funding	16. Create specific funding dedicated to mental health research
Improve the level of funding dedicated to mental health research	17. Increase the link between policy makers and researchers and foster evidence-based policies in mental health and well-being.

and usage in a way that matches their potential. This common tool would facilitate collaboration, single- and multi-national projects, and would attract young researchers into the field. The European network of RI is sufficiently developed so that an online database of health databases with free access for the research community could be established. Specific funding should be dedicated to the creation, maintenance and translations related to this database of mental health databases.

The most important prerequisite of such infrastructure is to implement open-access for publicly-funded MHR data (recommendation #4). Indeed, another identified gap is the waste of resources resulting from lack of access to data from publicly-funded research projects. The open data philosophy is making inroads in the scientific community, and it would be possible to condition public funding on open access to data (e.g., clinical trial or cohort data) unless these data are particularly sensitive or not anonymised. The open-

access policy in H2020 program conditions funding to open access to publicly-funded MHR publications (recommendation #3); since the 1st January 2017 EU funded projects are by default part of the Open Data Pilot, i.e., should share their research data through a dedicated data repository (Guedj and Ramjoué, 2015; OpenAIRE Consortium, 2017), hopefully most national funders will follow this lead.

Even when they are known, rules of accessibility of RI, such as databases, are not homogeneous and sometimes not clearly communicated. Even though Europe has an increasing network of RI, there is still a need to better communicate in order to facilitate access by a maximum of users. Financial and legal means should also be provided to the RI to allow them increasing their accessibility. Numerous and important generic RI currently exist in Europe and are mapped by the MERIL project. It is likely that complete information on infrastructures, their types and their accessibility rules will soon be available to the MHR community, which goes

Infrastructures	Human resources
<ul style="list-style-type: none"> • Build an infrastructure that maps all research resources • Increase their visibility, access and use • Harmonization of indicators and process • Open data and access policies • Research networks and knowledge exchange activities 	<ul style="list-style-type: none"> • Pan-European MHR courses and resources sharing • Basic research training to every health professional • Academic careers conditioned by research skills • Bridge the academic and industrial sectors • Incorporate MHR in generic research training tracks • Users and clinicians involvement in research
Funding	
<ul style="list-style-type: none"> • Transparency in the definition of research priorities • Policymakers, clinicians, users and researchers dialogue • Faster and more flexible funding mechanisms 	<ul style="list-style-type: none"> • Core funding and long-term calls • Funding dedicated to mental health research • Matching the burden of mental disorders

Fig. 2 Overview of the recommendations on MHR resources.

toward an increase of their visibility, access to and use (recommendation #5).

5.2. Goal 2: encourage collaborative and multidisciplinary projects to create the “critical mass” necessary

MHR is particularly interdisciplinary which leads to a need for more collaboration in research work in Europe, instead of competition. This is further necessary to tackle regional disparities in terms of resources, access to data and funding. Although existing networks have been described as creating an administrative burden, European e-networks as well as investigative and scientific networks have been identified as key infrastructures to develop interdisciplinary and international research and powerful tools for the mutualisation of research means. That is why the focus groups agreed on the increase of the number, quality and efficiency of international and interdisciplinary networks (recommendation #6) as well as to develop systematic knowledge exchange activities for MHR in Europe (recommendation #7). The networks could ensure the storage, sustainability and protection of open-access databases, develop the use of common research languages, procedures and standards throughout Europe, limiting biases and increasing the reproducibility of studies. Such networks could be formal or informal but require a minimum level of funding which could be included in any funding proposal as ‘networking activities’. To be competitive with the rest of the world, the critical mass could easily be reached at the European level through “scientific networks” especially when researchers-led. They would also foster informal meetings and knowledge exchange activities. Such small events where researchers could meet and develop ideas together could be initiated by public authorities, but they likely would be more efficient if they were

initiated by the researchers themselves, therefore, a specific budget/cost for “knowledge exchange activities” could be included in all funding, as a routine part of researchers’ activities.

On the other hand, so-called “investigative networks” could be initiated by public bodies to provide services to national and European research units. These networks are RI as defined in the European Strategy Forum on Research Infrastructures (European Commission, 2018) and may be linked to it. Attention should be given to not overburdening the management of networks and their accessibility with heavy administrative loads. Furthermore, incentives and support could be given to develop the use of Information Technologies in the networking activities.

6. Training, capacity-building and career pathways

6.1. Goal 3: develop access to MHR training

Heterogeneity in research training in Europe may be perceived as a limit to MHR collaboration. Furthermore, for countries that do not have the critical size to support a specific training program for MHR, programs with a European perspective are required. However, there are currently no European curricula for MHR training. Comparable research training among European researchers would facilitate exchanges and would likely improve overall research quality. To this end, it has been recommended to encourage and support the creation of European MHR courses and share available training resources (recommendation #8), indeed specific MHR masters and PhDs programs could be created at the European level and organised by several universities as it is done in other disciplines. This could also address the specific training needs of clinicians by giving them the clini-

cal and research skills necessary for the specificities of MHR. Increasing the sharing of available training resources in research and further encouraging students' mobility would ensure access to research training in regions without their own capacities. This latter point is especially important considering the East-West gap in research training. Europe has extensive experience in the mobility of students with numerous European masters in a variety of domains. The EU and individual countries can provide incentives for the creation of European mental health masters, inter-university PhDs programs as well as short courses open to every professional, guidance for the harmonisation of research training of health professionals and additional support for student mobility. Efforts should be directed to increasing the possibility of e-learning and other distance training, based on existing pilots and experiences in other fields.

6.2. Goal 4: close the gap between clinical practice and research

There is a lack of coordination between clinical practice and research in mental health. There is also a lack of transversality in the training of psychiatrists and other mental health professionals, which is a handicap in such a multidisciplinary field. To bridge the gap between research and clinical practice in mental health, it would be of great interest to provide basic research training to every health professional (recommendation #9) so that they understand the use of evidence in medicine and are equipped to implement research outcomes. On the other hand, researchers need to be informed by clinicians and patients about current interrogations and observations that could lead to research questions. This recommendation is of concern for patients, professional associations and medical schools.

In Europe, an individual's research record, training and teaching experience are not always the key determinants for appointments to senior academic positions. Conditioning academic careers on the development of research skills (recommendation #10) might increase European research competitiveness. For instance, incentives should be created to increase the number of merit-based appointments. These measures are also likely to increase the attractiveness for junior scientists of academic MHR. Moreover, better transparency regarding the criteria and processes of academic appointments would require little in terms of financial resources.

6.3. Goal 5: increase the attractivity of mental health research

Due to the absence of clear career paths and the prevalence of short-term employment contracts, young trainees (in medical school or research training) may be discouraged from entering an academic career in MHR. There is a gap between academic and industrial careers in some parts of Europe, compared to regions where researchers can easily pass from a private company to a public research unit easily. Therefore, it is needed to improve the "employability" of researchers and bridge the academic and industrial sectors

to offer variety and opportunities for research-oriented careers (recommendation #11). The training of mental health researchers should include modules that foster their competencies not only in the public but also in the private sector. This would clearly improve the attractiveness of MHR. Moreover, the quality of research itself would be likely to be improved because of cross-fertilisation of private and public research ideas and concepts. And several practical skills developed in the private sector could be useful in the public sector.

Finally, it has been recommended to incorporate and/or promote MHR in related research training tracks (recommendation #12), the main share of MHR training is currently taking place in courses related to psychiatry, psychology and neurosciences. However, given the burden of the mental diseases, MHR is concerned with and requires a much wider range of disciplines: public health, social sciences, epidemiology and biostatistics. This recommendation is relevant both to institutions offering courses and to EU/national authorities. While the former may readily incorporate such a change in practice into their course designs, the latter may provide the appropriate guidance and harmonisation.

7. Funding strategies

7.1. Goal 6: promote innovative, competitive and excellent research

It appears that sometimes calls for proposals in MHR do not respond to research needs and that their phrasing is ambiguous. This may be due to the weak visibility or absence of existing bottom-up and consultative mechanisms for the development of calls. Researchers and/or clinicians are the most informed of the state of the art in their own domains, and the other hand, policymakers and patients' organizations are more aware of the populations and policy needs. A stronger dialogue between them would orientate the calls for proposals for the most innovative and useful fields. In any case, transparency in the development of calls for proposals must be increased and more researchers involved in the setting of research priorities (recommendation #13). Clarifying the means and consultative processes that allow researchers and patients to voice their research priorities appears to be feasible at a limited cost if any.

Due to a high administrative burden, it is difficult for mental health researchers to have access to rapid funding mechanisms. Moreover, with the grant application mechanism research units lose efficiency due to the time foregone for actual research. Some dynamic fields of MHR necessitate rapid investigation under specific circumstances; faster and more flexible funding mechanisms, especially in the short term should be created (recommendation #14) to facilitate competitive research on these topics. Initiatives from researchers are difficult to fund at the European level, and thus the calls system may be balanced with more investigator-driven projects.

The relative lack of core funding of MHR creates instability of mental health researchers' careers leading to a low attractiveness of the field. In addition (and paradoxically), a low level of core funding impedes research units from responding to calls due to the lack of human resources nec-

essary for the application processes. Moreover, it is debatable whether having several research units compete for one project is efficient, given that eventually only one unit will obtain the grant while other competitors will have worked on the same subject for few if any outcomes. Due to the dominance of project-based funding in European research, junior researchers are often faced with professional insecurity, which is a disincentive for pursuing research careers (especially compared to clinical practice). A shift towards longer funding periods and an increase in the proportion of core funding and/or development of long-term calls (recommendation #15) seems necessary. Further, long-term projects - such as cohorts - would be encouraged. Calls for proposal also represent an administrative burden, such as the requirement of detailed budget predictions that may seem arbitrary. The necessary funding controls could be made more *a posteriori* and linked to a lighter administrative burden.

7.2. Goal 7: improve efficiency of MHR funding

There is a lack of resources dedicated to MHR in Europe, and it appears that the proportion of investment in human and financial resources does not match the burden of mental disorders. Dedicated MHR funds would allow implementation of several of the recommendations made above. It seems worth considering the creation of specific funding dedicated to MHR (recommendation #16), possibly by having an institution dedicated to funding and structuring European MHR, similar to the National Institute for Mental Health (NIMH) in the US, and corresponding institutions or stable networks on the country level. Given the long-term course of mental disorders and the complexity of the underlying pathophysiology, risk and resilience factors, longer-term, structural funding is necessary in addition to project funding. In this view, the fact that the Mental Health Research Framework of the UK and the Mental Health program of the Netherlands Organisation for Health Research and Development adopted the mental health research agenda developed by ROAMER as research agenda is a positive development (NIHR, 2017; The Netherlands Organisation for Health Research and Development, 2017).

7.3. Goal 8: improve the level of funding dedicated to mental health research

There is a lack of dialogue between researchers, patients and policymakers, it is recommended to increase the link between policy makers and researchers and foster evidence-based policies in mental health and well-being (recommendation #17). It seems that European societies and decision makers are not fully aware of the importance of mental health and well-being research. Consultative entities should be created and expanded to transfer to decision makers the knowledge acquired about the mental health and well-being of the European population and the evidence on how to improve it (e.g., via mental health services registries). Likewise, researchers need to be better informed about the questions that are of particular interest to policymakers and patients. Moreover, indicators to evaluate

the potential benefit of MHR, especially in terms of socio-economic impact, should be developed to 'make the case'. Some new formats may need to be created to allow this exchange of knowledge between researchers, patients and policymakers with the goal of supporting evidence-based policies.

8. Discussion

These data and recommendations, drawing on various sources and a multidisciplinary, consensus-based process, give us insight on the strengths and challenges of European MHR. First, although many research resources exist, their optimal usage should be sought by means of increased visibility, access and sharing. This can be the case for infrastructures, or modified allocation of financial resources such as the proportion of core funding, or involvement of users and carers in the design of research protocols. Such measures require mostly coordination efforts and are thus feasible with a low input of physical resources. Second, however, physical resources are required for the creation of resources that are still lacking.

Readers should also be aware that several general observations arose during our research process. One debate concerned the increasing importance of neuroscience research, that occurred outside the context of clinical psychiatry and clinical mental health research. Hence, the rapid developments in paradigms might deserve clarification for clinical research and patient care practice. In this context, resources such as mental health RI and MHR dedicated training programs are dramatically scarce and often limited to the notably complex field of neurosciences whereas an integration as mentioned above should be the aim.

Another debate was about the amount of research funding for general health, compared to funding for MHR. This was found to be disproportional, as the share of health research allowed to MHR never matched the share of burden of diseases taken by mental disorders, even in "great nations" of MHR funding. A finding which is confirmed by a recent paper from Cochrane France that compares research effort in terms of number of randomised clinical trials by groups of diseases with corresponding DALYs between 2006 and 2016. They found a smaller gap than the one found in the Cordis® analysis of our own. Still, the proportion of MHR trials and number of patients included were both inferior to the share of DALYs attributable to mental disorders (Atal et al., 2018). Moreover the authors did not include self-harm in the DALYs attributable to mental disorders, which lead to an underestimation of the burden (Vigo et al., 2016).

A third debate concerned the finding that MHR impacts are wide, in practice and economically, which is why communication about this should increase dramatically. Then stakeholders should be included in MHR for greater results, impacts and research quality, and always include people with their own personal experience of mental disorders. Finally, researchers should be helped to cross both countries and the scientific boundaries of disciplines.

These recommendations and conclusions must be taken with regards to the limitations of this paper. First, the workshop attendance rate was 38%, this low to intermediate participation rate entails the risk of biases. However,

given the selection process and professional background of the ROAMER group and experts who participated, research priorities and recommendations reflect both scientific evidence and leading opinions in MHR. In addition, previous ROAMER publications yielded similar rates, and outcomes were further supported in two online Delphi-based survey (Elfeddali et al., 2014; van der Feltz-Cornelis et al., 2014). Second, two databases searched were not exhaustive, for example important RI such as the British 1958 National Child Development Study, which is still of great interest and importance for MHR (Takizawa et al., 2014), were not included when we searched the Meril[®] database. The On-Course[®] database was significantly biased toward British biomedical courses, extensively inventoried while we could not find any masters in psychology of other European countries for instance. This does not reflect reality. However, these database queries should be used as indicators to spot the share of MHR resources in these mappings, and their relative absence could be interpreted in two ways. Firstly: either mental health related training and RI are less prone to be included in these mappings than other disciplines, which might indicate a lack of resources, information or awareness. Alternatively it may simply be that these courses are relatively rare compared to other biomedical fields. For the RI mapping, we should also consider the possibility that MHR infrastructures such as cohorts and data registries do not yet consider themselves as infrastructures open to the research community. Also, MHR might be less resources-consuming in terms of infrastructures. Finally, some specific areas of mental health research, such as children psychiatry or addiction, which can be treated with dedicated specific research resources, were not investigated during our work.

To address these potential biases, several data sources (literature, databases and workshops) were used. This triangulation is known to increase the validity of research findings. Finally, the validity and generalizability were increased by the workshop participation of 14 mental health experts from the Roamer consortium who created a bi-directional linkage with the recommendations formulated in other thematic WPs (Haro et al., 2014). Our results and recommendations are also consistent with what can be found in the literature published after our workshop. For instance, the RAND Corporation has recently published a piece of work on research impact, including MHR impacts, distinguishing academic and societal ones (Pollitt et al., 2013; Guthrie et al., 2016). Their “lessons” overlap with our recommendations in several aspects, for example, the authors find that international and interdisciplinary research and stakeholder’s involvement are associated with greater impacts of MHR. The need for multidisciplinary research approaches and stakeholder dialogues has been emphasised in several findings of the Roamer project, including the recommendations for public mental health research (Forsman et al., 2015).

A particularity of our analysis was that the literature review took place at two points in time. Although unorthodox, this allowed creating perspective for the recommendations issued during the workshops. Indeed, most of the literature between 2012 and 2017 reinforces the ideas set out, especially toward the increase of all stakeholders, including the patients, participation in research.

Mental health and well-being is under-represented in relation to the burden of mental disorders and in comparison to other (health-related) research fields. This is reflected in insufficient training and funding opportunities. Awareness and advocacy will be required to match the efforts in these areas to the high and growing burden of mental disorders. Considering the quality and quantity of data collection and possibilities e.g., for registry linkages in some countries of Europe, Europeans are in a position to be key players in MHR if the resources are mutualised and stepped up.

These points raise the question of how the recommendations will be used by research decision makers, and under what circumstances the allocation of additional resources may seem to be acceptable in a context of enduring economic and financial difficulties in Europe. With regards to the economic rationale for the application or the recommendations, we reiterate that many recommendations should be feasible without substantial financial investment. Concerning the recommendations requiring new funds, evidence suggests that the return on investment for mental research is high. It was calculated at 37% for public and charitable MHR in the UK, comprising annual returns on health and Gross Domestic Product (GDP) gains (Martin Buxton et al., 2008). This suggests that it is a rational decision to dedicate additional resources to this field as well as rationalising existing resources. This could be done by a European infrastructure or network inspired either by the NIMH or the Mental Health Research Network in the US.

We also believe that such recommendations on resources are key to delivering the MHR priorities as stated by the whole Roamer consortium (Wykes et al., 2015).

Conflict of interest

All the authors declare no conflict of interests related to this study.

Contributions of authors

Jean-Baptiste Hazo, Matthias Brunn, and Maya Dorsey organised collected the qualitative and quantitative data used in the paper. They also analysed them and redact the present paper. Marion Leboyer, Karine Chevreul, Jacques Demotes-Mainard, Matthias Brunn and Jean-Baptiste Hazo defined the methods within the Roamer framework, organized the workshops and animated them as well as defined the data sources. As Consortium coordinator Carla Obradors-Tarragó and Josep Maria Hara defined the global methodology within which the present study took place. Christina M. van der Feltz-Cornelis, Kristian Wahlbeck, Susanne Knappe and Andreas Meyer-Lindenberg revised the content of the present paper and made substantial additions. As well as Til Wikes, Marion Leboyer and David McDaid who also co-redact the paper.

Role of funding source

The research leading to these results has received funding from the European Commission’s Seventh Framework

Programme (FP7, 2007-13) under grant agreement number 282586, and from the National R&D Internationalisation Programme of the Spanish Ministry of Science and Technology under Reference ACI-PRO-2011-1080. The funder had no role in the study design; data collection, analysis, and interpretation of data; neither in the writing and in the decision to submit the paper for publication. This publication reflects only the authors' findings and views. The European Union is not liable for any use that may be made of the information contained therein.

Acknowledgements

The ROAMER project has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement no. 282586, and from the National R&D Internationalisation Programme of the Spanish Ministry of Science and Technology under Reference ACI-PRO-2011-1080. We deeply thank Meryl Darlington for her proof-reading of the manuscript and the Cordis®, Meril® and On-Course® teams who were very supportive in the data transmission and explanation.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.euroneuro.2018.11.1111.

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