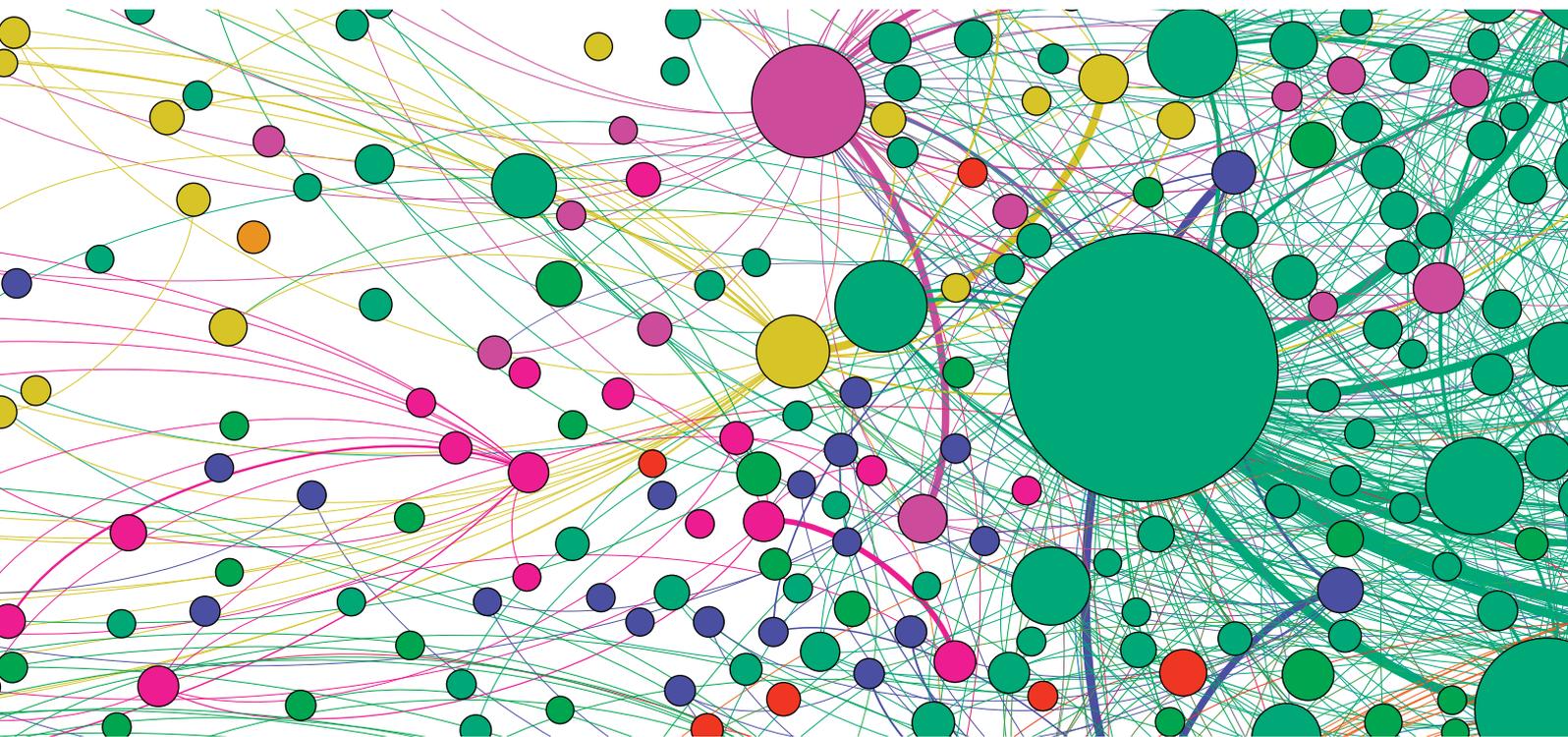


Project Ecosystem: Mapping the global mental health research funding system

CROSS-CUTTING THEMES



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Published by the RAND Corporation, Santa Monica, Calif., and Cambridge, UK

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Preface

This document sets out six themes that emerged from the study 'Project Ecosystem: Mapping the global mental health research funding system', which mapped the global funding of mental health research between 2009 and 2014. The study built up a picture of who the major funders are, what kinds of research they support and how they relate to one another. The analysis was based on the funding acknowledgements on more than 220,000 journal papers from the global mental health research field, alongside 32 'deep dive' profiles of research funders in Canada, the UK and globally.

The main report, deep dives and other accompanying documents are available from www.randeurope.org/mental-health-ecosystem.

Acknowledgements:

We are grateful to the International Alliance of Mental Health Research Funders and in particular the members of the Alliance who kindly supported the study: the Graham Boeckh Foundation, Alberta Innovates – Health Solutions, the Canadian Institutes of Health Research, the UK National Institute for Health Research, the Well-

come Trust, MQ: Transforming Mental Health, and the Movember Foundation.

The bibliometric data for the study was provided by the Observatoire des sciences et des technologies (OST). Eddy Nason contributed to the Canadian fieldwork and the team at ÜberResearch contributed useful discussion and suggestions.

We very much appreciated the helpful and timely comments of our quality assurance reviewers (Salil Gunashekar and Saba Hinrichs). The report was copy-edited by Suzanne Needs and designed by Paul Barrett Book Production.

Finally, we are very grateful to all of the organisations who agreed to participate in our deep dive reviews and the researchers who completed surveys as part of the study.

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Attitudes to collaboration

Key points

- 61 per cent of papers we examined acknowledged more than one funder. Papers with more than one funder were also more highly cited.
- Almost all the funders we interviewed were involved in collaborations, but to varying degrees and at different levels of interaction.
- Most larger funders tended to engage in interactions across all three levels (collaboration, coordination, cooperation), whereas smaller funders were more likely to have informal relationships with other funders.
- Most of the funders we talked to expressed a desire for more collaboration, but noted key barriers around aligning timeframes, funding cycles and priorities.

We were told that collaboration between funders and researchers focussed on mental health has become particularly significant given the increasingly complex and interdisciplinary nature of most mental health disorders. While much has been written on researcher collaboration and the benefits of collaboration in health research more generally,¹ less is known about collaboration between research funders, especially within mental health. From our bibliometric analysis, we found that 61 per cent of papers with funding acknowledgements mentioned more than one funder. Papers with more than one funder were also more highly cited, with an average relative citation score of 1.98, compared with 1.29 for papers with only one funder.

It is important to note that while funding acknowledgements may suggest collaborations among funders, funding acknowledgements show how research funders in our dataset are connected

to each other through researchers holding multiple funding awards and through researcher collaborations, rather than funder collaborations. Therefore, in our interviews, we were keen to establish the distribution and co-occurrence of funding acknowledgements compared with funding collaborations.

Almost all the funders we interviewed were involved in collaborations with other funders, but the extent and depth of these interactions varied. Funder collaboration, much like more general organisational collaboration, has different levels of intensity depending on the level of engagement and the desired outcomes of the partnership. In this respect, collaboration can be conceptualised into three main categories of partnerships, namely, cooperation, coordination and collaboration, each representing a different level of interaction or 'connectedness'.² This continuum is summarised in Figure 2 below.

¹ Lee, S, & Bozeman, B. 2005. The impact of research collaboration on scientific productivity. *Social Studies of Science*, 35(5), 673-702; Katz, J. S. & Martin, D. M. 1997. What is research collaboration? *Research Policy*, 26, 1-18; Lucas, A. 2005. International collaboration in health research. *Bulletin of the World Health Organization*, 83(7), 482.

² Brown, K, & Keast, R. 2003. Citizen-government engagement: community connection through networked arrangements. *Asian Journal of Public Administration*, 25(1), 107-131; Keast, R, Brown, K, & Mandell, M. 2007. Getting the right mix: Unpacking integration meanings and strategies. *International Public Management Journal*, 10(1), 9-33.

Figure 1.
Percentage of papers with funding acknowledgements that acknowledge more than one funder

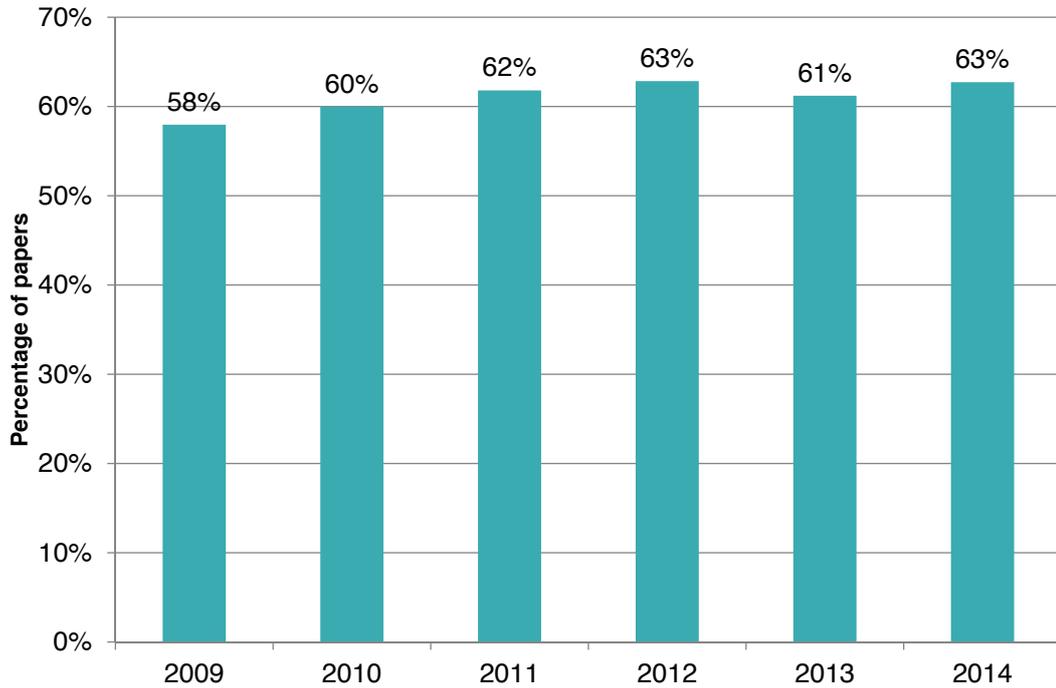
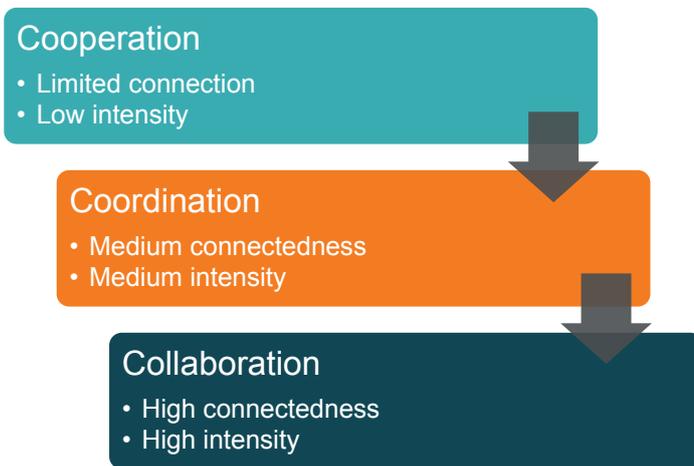


Figure 2.
Continuum of connectedness³



Collaboration: This term is used to describe the strongest link between research funders, whereby formal partnerships are established through joint funding and memoranda of understand-

ing (MoUs). Collaboration is often long-term in nature and has the highest degree of risk. It is also often the most difficult level of interaction to establish, as it moves beyond the sharing of information or coordination of activities. Examples highlighted in the ‘deep dive’ reviews conducted for this study include:

- Joint grants (e.g. NHMRC–beyondblue grants on anxiety and depression; BHF–Alzheimer’s Association call on vascular dementia)
- Cofunding of programmes/networks (e.g. CIHR and the Graham Boeckh Foundation’s cofunded Transformational Research in Adolescent Mental Health (TRAM) program in Canada)
- Joint centres (such as the Behavioural and Clinical Neuroscience Institute, funded in the UK by the MRC] and the Wellcome Trust)
- MoUs (such as the MoU between Grand Challenges Canada and the NIMH Grand Challenge program)

Coordination: This term is used to describe a partnership between funders where there is an alignment of activities or contribution to a spe-

³ Adapted from Brown & Keast (2003)

cific, agreed-upon programme of actions (such as national research initiatives). The efforts involve not only information sharing, but also joint planning. This level of linkage requires a higher degree of effort than cooperation; it also requires commitment and often an increase in formality in structures and processes. An example of this is the National Research Action Plan for Improving Access to Mental Health Services for Veterans, Service Members, and Military Families, involving the Department of *Veterans Affairs* (VA) and other US government research funders. The programme focuses on post-traumatic stress disorder (PTSD), other mental health conditions and traumatic brain injury, ‘to improve the coordination of agency research into these conditions and reduce the number of affected men and women through better prevention, diagnosis and treatment’.⁴

Cooperation: This term is used to describe informal partnerships between funders, whereby funders primarily share information or participate in wider forums/platforms with other research funders. Cooperation is often short-term and informal, and it requires relatively few resources. In addition to the International Alliance of Mental Health Research Funders, of which 16 of the funders interviewed are members, examples of platforms for cooperation include:

- the International Alzheimer’s Disease Research Portfolio (IADRP), led by the Alzheimer’s Association, which includes more than 30 funding organisations from around the world to address challenges and opportunities for collaborations in Alzheimer’s and related dementia science
- the Alliance of Mental Health Research Funders in the UK, which includes Mental Health Research UK and MQ as well as 11 other charities and foundations, which meets twice a year to share progress, generate new ideas for improving mental health research and lobby for more funding for mental health research in the UK

Different levels of interaction

Building on the framework outlined above, we sought to characterise the different levels of interaction experienced by our ‘deep dive’ research funders with other mental health research funders. The levels of interaction of our sample of funders were characterised based on self-reported data gleaned from interviews and through document review. It is important to note that we looked specifically at patterns of interaction around mental health research only and that more general funders may engage at different levels in other topics/research domains. Most larger funders tended to engage in interactions across all three levels, whereas smaller funders were more likely to have informal relationships with other funders.

Opportunities for future collaboration

The majority of research funders interviewed expressed an interest in expanding the number of interactions they have with other mental health research funders.

Shared values/alignment of objectives: The need for potential collaborators to share similar values and goals was the most frequently cited attribute research funders look for in forming new collaboration partners. In the case of public funders, the alignment of funder objectives with wider government objectives was also seen as important. Funders also noted that collaborations are often easier with those who share similar levels of risk, available funding, timeframes and funding decision practices – in addition to values and goals. A small number of funders also mentioned that other funders’ commitment to research translation was a key attribute, although we noted that there are substantial differences between funders as to what constitutes translational funding (see cross-cutting theme on Types of Funding).

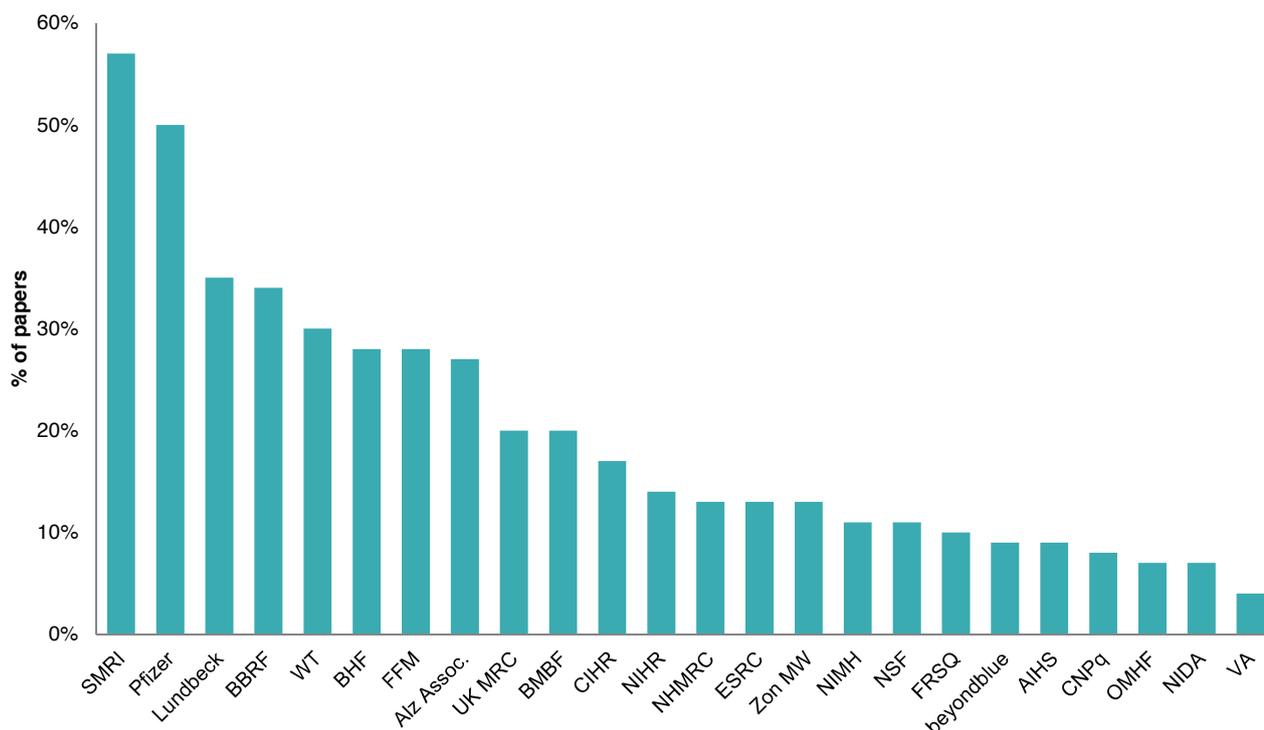
Diversity of funders: While the majority of funders felt that collaborations with similar funders (both in type and in research area) were the most desirable, some funders also mentioned the opportunities for collaboration with funders outside the mental health (and health, more generally) research funding ecosystem. In particular,

⁴ Improving Access to Mental health Services for Veterans, Service Members, and Military Families: Exec. Order No. 13625, 77 FR 54783. (2012)

Table 1
Different levels of interaction with other research funders

Funder	Member of the International Alliance of Mental Health Research Funders	Collaboration (e.g. joint calls, formal partnerships)	Coordination (e.g. cofunded centres/initiatives)	Cooperation (e.g. information sharing)
AIHS	✓	✓	✓	✓
Alz Assoc.		✓	✓	✓
BBRF	✓			✓
beyondblue		✓		
BHF		✓	✓	
BMBF		✓		
CIHR	✓	✓	✓	✓
CNPq		✓		✓
ERC		✓		✓
ESRC		✓	✓	
FFM	✓			✓
FRQS	✓	✓	✓	✓
GBF	✓	✓	✓	✓
Grand Challenges Canada	✓	✓		✓
Lundbeck		✓	✓	✓
MHRUK				✓
Movember	✓			✓
MQ	✓			✓
NHMRC	✓	✓	✓	✓
NIDA		✓	✓	
NIHR	✓	✓	✓	✓
NIMH	✓	✓	✓	✓
NSF		✓	✓	✓
OBI	✓			✓
OMHF	✓	✓	✓	✓
Pfizer				
SMRI				✓
UK MRC		✓	✓	
VA		✓	✓	✓
Wellcome Trust	✓	✓	✓	✓
YAWCRC	✓	✓		✓
Zon MW		✓		

Figure 3
Percentage of papers with a corresponding address outside of the funder's location³



the opportunity to work with funders from different disciplines and research areas to foster interdisciplinary research was seen as significant given that funders believe that solutions to some mental health problems may not lie solely in the health research sphere. Other funders noted that collaborations with different types of funders (e.g. government funders creating links with industry/charities) offered an opportunity to increase the chance of creating impact from the research funded.

Geographical considerations are also a significant factor in the potential for future collaborations. This is reinforced by our findings in the bibliometric analysis, which highlights a close correlation between funder location and modularity class⁵ (see Section 2.6 of the main report).

While a small number of funders expressed the desire to collaborate with other research funders outside their country, international collaboration remains limited. Whether explicit or implicit, many research funders' primary remit is to fund research in their own countries. Figure 2 below shows the percentage of papers with a corresponding author address outside of a funder's location for our sample of 'deep dive' funders. The majority of funders primarily fund research within their own country, which has implications for potential collaboration partners in the future. While there appears to be an increase in international collaboration among researchers on mental health research (Larivière et al. 2013), the trend for the entire dataset shows that the percentage of papers funded outside a funder's location has remained at around 18 per cent year-on-year.

Pooling resources: A number of smaller funders noted that collaboration offered the opportunity to pool resources and create economies of scale for funders. Some public funding agencies also noted the opportunity to leverage funding through collaboration as a way to mitigate potential cuts from the government and public agencies.

⁵ Modularity is a measure of structure in networks. Networks with high modularity consist of clusters of nodes with dense connections, which are only sparsely connected to each other. For more information, see Appendix A in the main report.

⁶ The figure excludes funders with fewer than 10 acknowledgements in the dataset (GBF, OBI, Grand Challenges Canada, MHRUK, Movember, MQ and YAWCRC) and multilateral agencies (such as ERC).

Challenges in establishing collaborations

While not explicitly mentioned by the funders, many of the challenges outlined below are often applicable to more intensive forms of collaboration than to cooperation/coordination through information sharing or aligning activities.

Aligning timeframes/models of funding: The majority of funders mentioned the difficulties in working with funders that have different timeframes or models of funding. Collaborations between different types of funders (e.g. charities, government, industry) can be complicated due to the different funding models. Funders, particularly in the public sector, are often tied to rigid funding cycles, which can be problematic when they require approvals at different levels.

Aligning priorities: Similar to the point above, some funders also mentioned that future collaborations were more likely in fields similar to those they already fund. This was felt to be wider than just research areas, with some funders noting that harmonization of organisational cultures and political alignment could also be considered as obstacles. The lack of a common definition of mental health across research funders was also seen as an obstacle to aligning priorities.

Geographic scope: As previously noted, a number of funders are either explicitly or implicitly restricted to funding in their own countries, which some felt had implications for potential interna-

tional collaborations. Differences in national priorities on mental health may also impact on transnational collaboration efforts.

Competitive dynamics: A small number of funders mentioned that competition between funders may also be a barrier to formal collaboration, particularly with respect to issues of attribution related to research funding. However, other funders noted that issues around attribution are less pertinent than they used to be and that there is recognition from funders that claiming contribution rather than attribution is commonplace.

Resources needed to support collaborations: Some of the smaller funders analysed also noted that while they are open to collaborations, more formal collaborations often require a large amount of resources, in terms of both money and time.

This theme is one of six identified in the study 'Project Ecosystem: Mapping the global mental health research funding system', which mapped the global funding of mental health research between 2009 and 2014. The study built up a picture of who the major funders are, what kinds of research they support and how they relate to one another. The analysis was based on the funding acknowledgements on more than 220,000 journal papers from the global mental health research field, alongside 32 'deep dive' profiles of research funders in Canada, the UK and globally. The main report, deep dives and other accompanying documents are available from www.randeurope.org/mental-health-ecosystem.

Definitions of mental health research

Key points

- Definitions for mental health research are used in two ways, either to inform what areas of research to fund or to report on research funded.
- There is a lack of consistent definitions of mental health research among funders, particularly for informing what to fund.
- Most UK research funders use the Health Research Classification System (HRCS) to report on the research they have funded.
- A large number of funders do not see the value of shared definitions.

The preliminary step in our study was to understand how mental health research is defined by funders, exploring how mental health research is conceptualised and which research areas within mental health are funded. The complex nature of mental health entails that research into mental health cuts across a variety of academic disciplines (psychiatry, psychology, genetics, etc.), research levels (basic, applied, services research, epidemiology). In an early review of mental health research funding, Pincus and Fine (1992)¹ define mental health research as follows:

Research on mental disorders and mental illnesses is distinguished by an emphasis on mental disease or mental pathologic characteristics, whether at the level of basic science or of clinical investigation of the person, health service system or epidemiologic population [...] Research may involve clinical, subclinical and normal subjects as well as animal models and tissue, as long as they are relevant to the disorder or system under investigation (1992:574).

Funder definitions of mental health research

Definitions of mental health research can be used by funders in two ways:

- Definitions can be used to inform what to fund in mental health.
- Definitions can allow funders to report on what they have funded.

Used together, both of these ways can allow funders to conduct a gap analysis of the areas of mental health they are funding. At an aggregate level, shareable definitions across research funders allow for a broader gap analysis to be conducted and may offer insights into how research funding allocation can be informed at a national/international level. However, producing shareable definitions at an aggregate level is difficult given the diversity of research funders and lack of consensus on what constitutes mental health (e.g. substance abuse is commonly included in US funders' definitions but not in UK and Canadian funders' definitions).

Given the variation in definitions of mental health research across different countries, the first question we asked our sample of funders was whether they have a definition of mental health (MH) research and if so, how they use that definition. Our findings are highlighted in Table 1 below.

¹ Pincus, H. A., & Fine, T. 1992. The 'anatomy' of research funding of mental illness and addictive disorders. *Archives of General Psychiatry*, 49(7), 573-579.

Table 1.
Research funders' definitions of mental health research

Funder	Country	Type of funder	Definition of mental health
AIHS	Canada	Health general	Uses a mental health classification based on medical subject headings (MeSH) terms and key words
Alzheimer's Association	US	MH condition	Exclusively funds research into Alzheimer's disease
BBRF	US	MH general	Mental health research funded includes research across all brain and behaviour disorders
Beyondblue	Australia	MH condition	Mental health research funded includes depression, anxiety and suicide
BHF	UK	Other non-MH area	Uses the HRCS classification system for reporting; mental health is not a core area of funding, so the organisation does not have a definition
BMBF	Germany	General	Does not work with a specific definition of mental health
CIHR	Canada	Health general	Believes it is better not to have a definition to inform what to fund
CNPq	Brazil	General	Mental health is not a core area of funding, so does not use a definition
ERC	EU	General	Does not have formal definition of mental health, as it has a broad focus covering biological investigation of the bases and diagnosis of specific disorders as well as well-being and social aspects of mental health
ESRC	UK	Non-health	Uses the HRCS classification system, although it does not have a formal definition; also includes well-being and social aspects of mental health
FFM	France	MH general	Mental health research funded includes autism, schizophrenia, bipolar disorder, suicide and obsessive compulsive disorder
FRQS	Canada	Health general	Does not have a definition of mental health, although it believes parameters might be useful
GBF	Canada	MH condition	Does not have a formal definition; funds initiatives in the area of mental health, predominantly focusing on systems
Grand Challenges Canada	Canada	Health general	Mental health research funded includes depression, anxiety disorders, schizophrenia, bipolar disorders, alcohol and drug use disorders, emotional and behavioural disorders of childhood and adolescence, developmental disorders of childhood, migraines, dementias and epilepsy
Lundbeck	Denmark	Health general	Believes it is better not to have a definition to inform what to fund
MHRUK	UK	MH general	Funds research exclusively into mental illnesses, their causes and cures; does not include dementia
Movember	Australia	Health general	Uses the WHO definitions to report on its mental health research portfolio
MQ	UK	MH general	Defines mental illness as a condition that significantly interferes with an individual's cognitive, behavioural, emotional or social abilities, causing distress
NHMRC	Australia	Health general	Uses the Australian government's definition of mental illness, namely, a clinically diagnosable disorder that significantly interferes with an individual's cognitive, emotional or social abilities

Funder	Country	Type of funder	Definition of mental health
NIDA	US	MH condition	Does not have a specific definition of mental health; considers substance use disorders to be within mental health
NIHR	UK	Health general	Uses the HRCS classification system for reporting, although it does not have a formal definition; believes that it is better not to have a definition
NIMH	US	MH general	Funds research into brain disorders expressed as complex cognitive, emotional and social behavioural syndromes; uses its Research Domain Criteria (RDoC) initiative to classify research
NSF	US	General	Mental health is not a core area of funding, so does not use a definition
OBI	Canada	MH general	Mental health research funded includes all brain and mental health-related functions and brain health
OMHF	Canada	MH general	Does not use a particular definition of mental health
Pfizer	US	Health general	Does not have a formal definition; the company suggested that the problem with developing a definition is that there are multiple inputs regarding the questions that it is trying to solve
SMRI	US	MH condition	Exclusively funds research into schizophrenia and bipolar disorder
UK MRC	UK	Health general	Uses the HRCS classification system for reporting, although it does not have a formal definition
VA	US	Health general	Mental health research portfolio spans mental, psychiatric and behavioural aspects of veterans' mental health
Wellcome Trust	UK	Health general	Uses the UK Health Research Classification System (HRCS) for reporting, although it notes that it is difficult to define and difficult to classify mental health
YAWCRC	Australia	MH general	Uses the WHO definition; uses broad definition of mental health and well-being, spanning from mental health promotion to relapse prevention, along with a holistic view of the individual and the individual's environment
ZonMw	Netherlands	Health general	Does not have a set definition of mental health

Table 1 highlights the broad spectrum of funder perspectives and uses of definitions. These include:

- funders that consider mental health research to be outside their core focus
- funders that have an implicit definition of the mental health research they fund
- funders with explicit definitions of mental health research and those that exclusively fund an aspect of mental health research

Overall, the majority of funders do not have an explicit definition of mental health research. A number of reasons for not having a definition of mental health research were noted, including:

- **Non-mental health focus/general funders** tend not to have a definition of mental health because they do not need one operationally.
- **Disease-specific funders** do not define mental health research because they are predominantly focussed on a particular area within the field of mental health.

In addition, some response mode funders noted that they believe it is better not to have a definition of mental health because they do not want to restrict the scope of research applications received. Those funders that do have definitions tend to be funders which exclusively fund mental health research.

Classification systems for defining and reporting on mental health research

Despite the lack of consensus among funders as to whether definitions are helpful, there are several different classification systems used for defining and reporting on health research, which include mental health research and which are used at both the national and international levels. These include:

- **Diagnostic and Statistical Manual of Mental Disorders (DSM).**² The DSM is a common classification of mental health disorders published by the American Psychiatric Association, which is used by a range of stakeholders, including clinicians, researchers and healthcare professionals. Currently in its fifth edition, the DSM contains a listing of the diagnostic criteria for every psychiatric disorder recognised in the US healthcare system. However, none of the funders explicitly mentioned using the DSM classification system.
- **World Health Organization (WHO) International Statistical Classification of Diseases and Related Health Problems (ICD-10).**³ An alternative to the DSM is the ICD-10, which is the standard diagnostic tool for epidemiology, health management and clinical purposes developed by the WHO. Mental and behavioural disorders [F00-F99] are grouped into the following 10 broad sub-categories: organic mental disorders; mental and behavioural disorders due to psychoactive substance use; schizophrenia, schizotypal and delusional disorders; mood (affective) disorders; neurotic, stress-related and somatoform disorders; behavioural syndromes associated with psychological disturbances and physical factors; disorders of adult personality and behaviour; mental retardation; disorders of psychological development; and childhood/adolescence behavioural and emotional disorders. Movember and YAWCRC both explicitly mentioned using the WHO ICD classification system.
- **UK Health Research Classification System (HRCS):** In order to better coordinate research funding activities and strategies, the UK Clinical Research Collaboration (UKCRC) developed a Health Research Classification System that includes mental health research topics. The system has been used in carrying out large-scale portfolio analyses across the 12 largest UK health research funding organisations and 29 charities. Among funders we investigated in our ‘deep dives’, the MRC, ESRC, NIHR, Wellcome Trust and BHF were involved in the UKCRC analyses. The mental health sub-category includes depression, schizophrenia, psychosis and personality disorders, addiction, suicide, anxiety, eating disorders, learning disabilities, autistic spectrum disorders and studies of normal psychology, cognitive function and behaviour.⁴ Dementia, Parkinson’s disease and other neurodegenerative diseases are not classified under mental health.
- **US National Institutes of Health (NIH) Research, Condition and Disease Categorization (RCDC) system:**⁵ The RCDC is a computerized reporting process used by the National Institutes of Health to categorise its funding in medical research. The RCDC reports NIH funding in 233 research, condition and disease categories. These categories are by their nature overlapping because it includes not only a category for mental health, but also categories for brain disorders, neurosciences and a number of major mental health disorders, such as schizophrenia and depression.
- **Medical Subject Headings (MeSH):** MeSH is a classification system used to index journal articles in the life sciences, which are applied to papers by the US National Library of Medicine. MeSH contains sets of terms naming descriptors in a 12-level hierarchical structure that allows for classifying research at various levels of specificity.⁶ Terms within the MeSH subset ‘Mental Disorders’ occur on 69 per cent of all papers (76 per cent of papers with acknowledgments) in our dataset.

² <http://www.dsm5.org/about/Pages/Default.aspx>

³ <http://www.who.int/classifications/icd/en/>

⁴ <http://www.hrcsonline.net/hc/mental>

⁵ <http://report.nih.gov/rcdc/>

⁶ <https://www.nlm.nih.gov/pubs/factsheets/mesh.html>

While these classification systems provide a useful tool for monitoring research portfolios and identifying gaps in the research, a limitation of using these classification systems to identify mental health research is that a large amount of research is ‘disease agnostic’, meaning that the research cannot be tied to a specific disorder.⁷ In an attempt to establish new ways of classifying mental disorders for research purposes, NIMH developed the Research Domain Criteria (RDoC) project, which aims to provide a different framework for classification based on behavioural dimensions and neurobiological measures.⁸ Major research domains in RDoC include: negative valence systems (fear, anxiety, loss); positive valence systems (reward learning, reward valuation); cognitive systems (attention, perception, working memory, cognitive control); systems for social processes (attachment formation, social communication, perception of self, perception of others); and arousal/modulatory systems (arousal, circadian rhythm, sleep and wakefulness).⁹

Overview of MeSH data for ‘deep dives’

In the absence of ready-made, common classification systems used across all of our funders, we have used MeSH headings to break down the research of our funders into eight major categories. Looking at the co-occurrence of MeSH terms on papers, we clustered the terms into eight categories using modularity classes¹⁰ and then derived names for these categories through inspection (see Section 2.5 of the main report). Such an analysis can allow funders to identify partners with similar interests.

Using the MeSH data from the papers in our dataset, we examined how funded research was spread across eight major mental health disorder categories (Table 2). The portfolio of research funded by the majority of funders analysed is spread across five major MeSH categories. Only six funders have more than 50 per cent of their papers focussed on a particular area (Alzheimer’s Association, beyondblue, FFM, BBRF, NIDA and SMRI). Neurodegenerative and cognition disorders were the most common set of MeSH terms for 14 of the 25 funders.¹¹ Depressive anxiety and personality disorders and schizophrenia, bipolar and other psychotic disorders were the most common set of MeSH terms for four and five funders, respectively.

This theme is one of six identified in the study ‘Project Ecosystem: Mapping the global mental health research funding system’, which mapped the global funding of mental health research between 2009 and 2014. The study built up a picture of who the major funders are, what kinds of research they support and how they relate to one another. The analysis was based on the funding acknowledgements on more than 220,000 journal papers from the global mental health research field, alongside 32 ‘deep dive’ profiles of research funders in Canada, the UK and globally. The main report, deep dives and other accompanying documents are available from www.randeurope.org/mental-health-ecosystem.

⁷ http://www.nimh.nih.gov/funding/funding-strategy-for-research-grants/white-paper_149362.pdf

⁸ <http://www.nimh.nih.gov/research-priorities/rdoc/index.shtml>

⁹ <http://www.nimh.nih.gov/research-priorities/rdoc/research-domain-criteria-matrix.shtml>

¹⁰ Modularity is a measure of structure in networks. Networks with high modularity consist of clusters of nodes with dense connections; these nodes are only sparsely connected to each other. For more information, see Appendix A in the main report.

¹¹ Funders with fewer than ten papers in the dataset were excluded from the analysis.

Table 2.
Degree of specialisation by MeSH disorder category¹²

	Percentage of papers with F3 MeSH terms	Neuro-degenerative and cognition disorders	Substance use and addictive disorders	Depressive anxiety and personality disorders	Schizophrenia, bipolar disorder and other psychotic disorders	Neuro-developmental disorders	Sleep disorders	Eating disorders	Sex development disorders
Alzheimer's Assoc.	99%	97%	0%	3%	1%	1%	1%	0%	0%
NIHR	87%	41%	10%	19%	19%	13%	4%	5%	1%
NSF	95%	41%	10%	14%	10%	21%	7%	0%	4%
MRC UK	93%	40%	13%	16%	20%	20%	3%	1%	1%
ERC	92%	39%	9%	14%	16%	26%	2%	2%	1%
CIHR	92%	37%	17%	20%	16%	14%	7%	2%	0%
AIHS	87%	36%	16%	27%	13%	15%	3%	2%	1%
BHF	75%	34%	27%	20%	5%	8%	9%	0%	0%
FRQS	93%	33%	11%	25%	16%	15%	15%	2%	0%
BMBF	95%	33%	10%	23%	19%	16%	4%	3%	1%
VA	91%	31%	24%	29%	20%	3%	7%	0%	0%
NHMRC	90%	31%	19%	25%	22%	12%	5%	1%	0%
Wellcome Trust	92%	30%	12%	18%	24%	23%	3%	1%	1%
ESRC	84%	28%	19%	17%	11%	29%	7%	0%	0%
Pfizer	94%	26%	16%	24%	21%	6%	16%	1%	0%
Lundbeck Foundation	96%	25%	12%	26%	34%	14%	4%	0%	0%
ZonMw	89%	24%	15%	34%	16%	18%	5%	1%	0%
CNPq	93%	23%	11%	28%	20%	12%	15%	2%	1%
OMHF	95%	17%	8%	32%	45%	13%	1%	3%	0%
NIMH	90%	14%	12%	39%	32%	17%	3%	3%	0%
BBRF	96%	10%	7%	33%	58%	11%	2%	1%	0%
SMF	96%	9%	5%	25%	79%	7%	1%	0%	0%
beyondblue	75%	4%	11%	66%	25%	5%	1%	0%	0%
NIDA	95%	4%	80%	14%	6%	7%	2%	1%	0%
FFM	93%	4%	4%	13%	55%	43%	4%	1%	0%

¹² Percentages show the proportion of papers with F3 MeSH terms in each of the 8 disorder categories. F3 MeSH terms relate to mental health disease-specific subject headings. Papers can have MeSH terms in several disorder categories; therefore the totals do not equal 1.

Evaluation practices

Key points

- Nearly all the funders we examined carried out evaluations – but the methods and reasons varied.
- The two most commonly cited reasons for doing evaluation were to assess and demonstrate impact and to evaluate funding programmes.
- Grantee reports and bibliometrics were the most common sources for evaluation data.
- While some funders are looking to assess the wider impacts of the research they fund and are setting up systems to collect relevant data from grantees, analysis approaches are still evolving.
- Funders are starting to use shared IT tools to track the impact of their research, but there are fewer examples of joint analysis.

Our sample of funders ranges from small charities to large government funders, and it includes funders focused on specific health conditions, populations and basic research. This variety is reflected in the funders' approaches to evaluating the research they fund. All but two of the funders we explored in our 'deep dives' carry out some form of evaluation of their research portfolio. However, there is variation in the scale, scope and type of evaluation done; the reasons for it; and how the information gathered is used.¹ Here, we first look at the reasons why our funders are doing evaluation. Then we look at the scope of outputs they examine and the tools they use.

Purposes of evaluation

We used the 4As framework to consider the purposes of evaluation: analysis (of the effectiveness of funding at achieving specific objectives or scientific balance), accountability (demonstrating to the general public or to donors that funds were

spent appropriately), advocacy (showing what the funded research has achieved in terms of societal benefits) and allocation (informing decisions about which projects, individuals or institutions to support) (Figure 1 Reasons to evaluate research).²

The most commonly cited reason for evaluation was analysis (mentioned by nearly two thirds of funders), while advocacy and accountability were each mentioned by about half of the funders. Only a small minority of funders described allocation as a primary focus for their evaluation work. In general, the public funders in our sample cited a wider range of reasons for doing evaluation than did their private counterparts, and the reasons mentioned did vary somewhat by group. Among private funders, purposes relating to advocacy were cited by more funders (7 out of 14) than were purposes related to analysis, accountability or allocation. Among public funders, purposes relating to analysis were cited by the highest number of funders (14 out of 18). Among both sets of funders, reasons relating to allocation were mentioned least frequently.

¹ The exceptions were Mental Health Research UK, which, as the newest organisation, is still in the process of considering how best to evaluate its research, and Movember, which evaluates individual projects but has not yet assessed its portfolio.

² Guthrie, S, Wamae, W, Diepeveen, S, Wooding, S, & Grant, J. 2013. *Measuring research: A guide to research evaluation frameworks and tools*. Cambridge, UK: RAND Europe.

Figure 1.
Reasons to evaluate research



Analysis

Around two thirds of the funders we spoke to described carrying out evaluation in order to do analysis. The purposes of this analysis include:

- Identifying gaps and checking for scientific balance in funding portfolios
- Informing strategic planning
- Evaluating success and effectiveness of specific programmes

Information from these analyses feeds into both individual funders' planning and efforts to coordinate with other funders. Coordination was particularly highlighted by the Alzheimer's Association and by US federal funders, which actively coordinate with others on research in such areas as autism; suicide prevention; and the mental health of veterans, military personnel and their families.

Accountability

Among government funders in our sample, there was a particular emphasis on evaluation for accountability because of the need to demonstrate to the public how money was spent and the need to justify budget requests. While funders do not generally make all of their evaluation information public, public funders have created public databases of grants funded and the associated publi-

cations (e.g. NIH RePORTER³ [USA] and Gateway to Research⁴ [UK]). Accountability was also highlighted by industry funder Pfizer, although in its case the focus is on internal accountability and commercial needs. Private funders generally did not emphasise the need to be accountable for their spending.

Advocacy

Both private and public funders identified reasons for evaluation that are related to advocacy, with nearly all of them emphasising the importance of demonstrating the societal or economic benefits, or 'impact', of the research they have funded as evidence to support their spending decisions or charity cause. Impact assessment is discussed further in the next section.

Allocation

Only a few funders suggested allocation purposes as a primary focus for their evaluation activities,

³ NIH Research Portfolio Online Reporting Tools (RePORT). As of 13 November 2015: <https://projectreporter.nih.gov/reporter.cfm>

⁴ Research Councils UK Gateway to Research (GtR) (homepage). As of 13 November 2015: <http://gtr.rcuk.ac.uk/>

though evaluation to inform allocation may be carried out in the context of specific programmes. One example comes from Dutch government funder ZonMW, which ran a €25 million programme called GeestKracht (tr. MindPower). The programme focused on mental health and funded three consortia for ten years (2001–2012). Funding was informed by results of consortia evaluations that were carried out every three years by an international expert committee and which included site visits.

Research outputs for evaluation

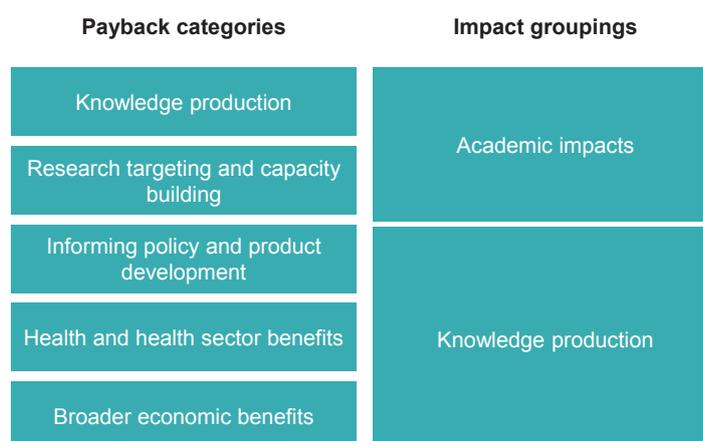
Data types and methods for gathering data

The majority of funders we spoke to collect data from two main sources: reports from grantees (submitted at the end of and/or during the funding period) and bibliometric information on the academic publications that have resulted from the research funded. This information enables evaluation to be carried out at the level of individual projects as well as across programmes, topics and entire portfolios.

The formality of funders' approaches to gathering data varied, with some (particularly public funders) carrying out comprehensive portfolio evaluations on a regular basis and others, such as the Graham Boeckh Foundation in Canada, favouring a more informal approach based on close interactions with grantees. Several funders have staff dedicated wholly or in part to gathering and analysing data; others have established evaluation committees, commission evaluations externally, or adopt some combination of these approaches.

The data that funders collect can be related to the five categories of research impact identified in the Payback Framework (Figure 2): knowledge production, benefits to research, political and administrative benefits, benefits to the health sector and broader economic benefits.⁵

Figure 2.
Payback categories and impact groupings⁶



Academic impacts: Knowledge production and research targeting and capacity building

More than half of the funders in our sample mentioned that they gather data through bibliometrics, which provide insights on knowledge production by tracking academic publications. Use of bibliometrics was more prevalent among public funders, with 12 of the 18 in our sample referring to its use, as compared with 5 of the 14 private funders. The ERC also mentioned using Altmetrics (which counts mentions of scientific articles in a wider range of sources, such as social media and newspapers). Just one funder, ZonMW, explicitly said it does not use bibliometrics. ZonMW reported that in evaluating its GeestKracht programme, it assumed its grantees' publication records would be strong, and therefore focused instead on goals relating to increasing involvement of clinicians in research. While the use of bibliometrics is widespread, some funders suggested that bibliometric data is less informative than its popularity might suggest. ERC president Jean-Pierre Bourguignon, for instance, has suggested that some funding agencies and research disciplines have become overly reliant on bibliometric evaluation. He has

⁵ Buxton, M, & Hanney, S. 1996. How can payback from health services research be assessed? *Journal of Health Services Research & Policy*, 1(1), 35–43.

⁶ Taken from Wooding, S, Hanney, S, Pollitt, A, Buxton, M, & Grant, J. 2011. *Project Retrosight: Understanding the returns from cardiovascular and stroke research: Policy report*. Cambridge, UK: RAND Europe.

also suggested that truly novel projects may take time to produce an impact and may not be the ones that will produce the most publications.⁷

A smaller group of funders (seven), the majority of them government funders, mentioned using evaluation to assess the balance of their portfolio. The evaluation of impacts on capacity building was mentioned explicitly by relatively few funders, though it is central to the missions of many of them. One example of capacity-building evaluation comes from the US charity BBRF. This funder has surveyed grantees on their further funding success, using the results as evidence that their selection process is effective and that their support provides a strong foundation for researchers.

Wider impacts: Informing policy, health and health sector benefits and broader economic benefits

Some of the funders in our sample – particularly public funders – look beyond the immediate impact that their funding has on the scientific community in order to explore impacts on health, policy and economies. For instance, a total of six funders (of which four are UK-based and four are public funders) reported that they are using or starting to use the tool Researchfish (described in the next section) for this purpose, and the MRC has begun publishing a comprehensive overview of the impacts it has collated through Researchfish.⁸

Grand Challenges Canada (GCC) has gathered data on impact from interviews with both grantees and the end users of the research it funds to provide evidence of the impact of its research. GCC has also made an effort to quantify the number of lives affected and jobs created by the research it has funded, as well as to track policy changes.

Canadian funder Alberta Innovates–Health Solutions (AIHS) plans its evaluations around an impact framework for assessing returns on research investment,⁹ which it developed based on a model from the Canadian Academy of Health Sciences (CAHS).¹⁰ The AIHS framework includes a system for tracking progress to impact, standardised indicators and metrics, and impact categories that extend beyond grantees' impact to include contributions made by AIHS itself. The CAHS model is based on the Payback Framework, which was also cited by the National Institute for Health Research (UK) as the basis for their evaluation approach.

The global men's health charity Movember has adopted an approach called the Results-Based Accountability™ framework to measure the progress of projects they fund and to improve programme and project performance. This framework, which aims to help organise programmes and initiatives around end goals, involves distinguishing between the results of a programme for populations and the results for clients and customers of that programme.¹¹

Several other funders – both charities and public funders – expressed an interest during our interviews in assessing these wider impacts but have not yet put in place systems for doing so. The director of the National Institute of Mental Health (NIMH) has said that in future, NIMH would consider evaluating its 2015 Strategic Plan for Research via the impact of research on the burden of disease, as opposed to focusing solely on publications and citations. The recently established charity MQ said it is developing processes to measure wider impacts.

This growing interest in assessing wider impacts is consistent with a growing international focus

⁷ Bourguignon was speaking at a meeting of the European Parliament's Committee on Industry, Research and Energy (ITRE) on 16 June 2015. As of 13 November 2015: <http://www.europarl.europa.eu/ep-live/en/committees/video?event=20150616-1500-COMMITTEE-ITRE>

⁸ Medical Research Council. 2015. Outputs, outcomes and impact of MRC research: 2014/15 report. As of 13 November 2015: <http://www.mrc.ac.uk/successes/outputs-report/>

⁹ Graham, K E R, Chorzempa, H L, Valentine, P A, & Mangan, J. 2012. Evaluating health research impact: Development and implementation of the Alberta Innovates–Health Solutions impact framework. *Research Evaluation*, 21, 354–367.

¹⁰ Canadian Academy of Health Sciences. 2009. *Making an impact: A preferred framework and indicators to measure returns on investment in health research*. Ottawa: CAHS. Note: The CAHS model is based on the Payback Framework of Buxton and Hanney (1996).

¹¹ The Implementation Guide. 2015. What are the basic ideas behind results-based accountability, and results-based decision making and budgeting? As of 13 November 2015: <http://raguide.org/1-1-what-are-the-basic-ideas-behind-results-based-accountability-and-results-based-decision-making-and-budgeting/>

on understanding how research benefits society.¹² But these impacts are more diverse than academic impacts, and approaches to data gathering are less routine than for academic impact. The National Science Foundation (USA) acknowledged that teasing out attribution and contribution related to impact poses particular challenges, especially for funders of more basic research.

Tools to aid evaluation

The funders discussed using a range of approaches, data sources and software tools. These include the online platforms ResearchGate and Mendeley for tracking researchers' activities. Tools that were mentioned by multiple funders are described in more detail below.

Researchfish¹³ is a software system that surveys researchers about their research outcomes, including academic and broader impacts. It is designed for use across multiple funders, requiring researchers to input data just once. The information it collects covers the following: publications, data sharing, collaboration, policy impacts, further funding awarded, prizes, intellectual property and commercial activities, careers of researchers' staff, public engagement activities, and facilities and resources used. The system, developed by a private company in collaboration with UK funders, including the Medical Research Council (MRC), went live in 2012. Among funders we investigated in our deep dives Researchfish users include NIHR, MRC, ESRC and BHF in the UK. Canadian funder AIHS also uses the system; it said it pays for the universities it works with to have some access to the impact data collected. The Lundbeck Foundation (Denmark) has also recently started to implement the system.

ÜberResearch¹⁴ describes its database and analytical tools as 'decision support systems for science funders'. Its product Dimensions for Funders is designed to support portfolio analysis and peer reviewer selection and to enable funders to compare their activities against those of major funders. ÜberResearch is based in Germany. Its parent company, Digital Science, also owns Altmetric and figshare. Among the funders we investigated in our deep dives, current ÜberResearch users include AIHS and CIHR in Canada and MQ, NIHR and the MRC in the UK.

ORCID¹⁵ is a non-profit community initiative to establish unique universal identifiers for researchers, enabling research publications and other outputs to be clearly linked to the individuals who produce them. Among funders we investigated in our deep dives, four mentioned using ORCID, namely, MQ, CIHR, NIHR and MRC. MQ mandates its use by grantees to facilitate output tracking. AIHS noted that ORCID has a strong potential to reduce administrative burden but that the organisation is reluctant to adopt it until its use becomes more widespread. Much of ORCID's services are free to use – any researcher can obtain an ORCID account, and researchers can then link their publications to their account. With a paid membership, individuals, institutions and organisation gain access to a member's API and features to integrate ORCID data with other systems. ORCID has its office in Bethesda, Maryland, and it has an international board of directors.

NIH RePORTER (Research Portfolio Online Reporting Tools)¹⁶ is a publicly accessible funding database maintained by the National Institutes of Health (NIH) in the USA. It provides data on research projects funded by the NIH and

¹² OECD. 2010. *OECD-Norway Workshop on Performance-based Funding for Public Research in Tertiary Education Institutions*; Academy of Medical Sciences. 2006. *UK Evaluation Forum Medical Research: Assessing the benefits to society*, London: Academy of Medical Sciences; Morgan Jones, M, Castle-Clarke, S, Manville, C, Gunashekar, S, & Grant, J. 2013. *Assessing research impact: An international review of the Excellence in Innovation for Australia trial*. Santa Monica, Calif.: RAND Corporation, RR-278-ATN.

¹³ Researchfish (homepage). As of 13 November 2015: <https://www.researchfish.com/>

¹⁴ ÜberResearch (homepage). As of 13 November 2015: <http://www.uberresearch.com/>

¹⁵ ORCID (homepage). As of 13 November 2015: <http://orcid.org/>

¹⁶ Research Portfolio Online Reporting Tools (RePORT) (homepage). As of 13 November 2015: <http://report.nih.gov>

the U.S. Department of Veterans Affairs, among others, and about publications and patents related to those projects. The data are drawn from other, existing databases. For instance, PubMed is used as the source for publications data. A Federal RePORTER database,¹⁷ which became available in 2014, includes data from a wider range of US federal funders.

This theme is one of six identified in the study 'Project Ecosystem: Mapping the global mental health research funding system', which mapped the global funding of mental health research between 2009 and 2014. The study built up a picture of who the major funders are, what kinds of research they support and how they relate to one another. The analysis was based on the funding acknowledgements on more than 220,000 journal papers from the global mental health research field, alongside 32 'deep dive' profiles of research funders in Canada, the UK and globally. The main report, deep dives and other accompanying documents are available from www.randeurope.org/mental-health-ecosystem.

¹⁷ Federal RePORTER (homepage). As of 13 November 2015: <http://federalreporter.nih.gov/>

How funding decisions are made

Key points

- The majority of funders rely on review by other researchers (peer review), but in the vast majority this is supplemented with other forms of review, including review by non-researchers.
- A minority of funders explicitly publish the criteria used by reviewers or the relative weights given to these criteria.
- Only three funders explicitly mentioned plans to make changes to their reviewing system.

For many research funders, both within and outside mental health research, funding decisions are made either wholly or in part on the basis of peer review.¹ Peer review is often considered to be the best method of allocating funding, yet numerous complaints about its limitations have also been made, regarding both its efficiency (e.g. high costs) and its effectiveness (e.g. reliability and accountability).² Alternatives to peer review, such as sandpits³ and reviews by expert panels comprised of researchers and non-researchers, have been explored by research funders, yet among the funders reviewed in this study, peer review remains the main method to assess research quality, albeit rarely on its own. It is useful to make a conceptual distinction between reviews by researchers and reviews by non-researchers. Classic peer review is based on review by researchers, yet among the

funders examined, peer review by researchers is often complemented by a review by others, such as senior staff of the funder or expert panels. Expert panels can also consist of researchers, yet since the level of involvement they have with the organisation is likely to be greater, they may have been selected more carefully and may have a better understanding of the goals of the funder.

There are several different methods commonly used in our sample of funders to make funding decisions. The table below shows the frequencies with which reviewing methods are used in our sample. Each of these methods will be discussed in turn.

Table 1.
Reviewing methods used by funders in our sample

Review only by researchers	6
Review by researchers complemented with a review by funder staff	11
Review by researchers complemented with a review by professionals	2
Review by researchers complemented with a review by an expert panel	10
Review by internal committee	5

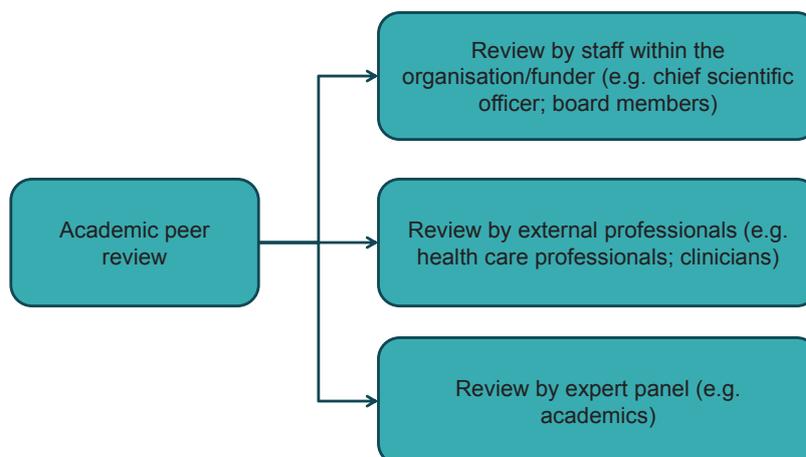
Note: Because some funders use more than one method, the total exceeds the 32 funders interviewed.

¹ E.g. Bornmann, L, & Daniel, H. D. 2005. Selection of research fellowship recipients by committee peer review. Reliability, fairness and predictive validity of Board of Trustees' decisions. *Scientometrics*, 63(2), 297-320.

² Guthrie, S, Guerin, B, Wu, H, Ismail, S, & Wooding, S. 2013. *Alternatives to Peer Review in Research Project Funding: 2013 Update*. Santa Monica, Calif.: RAND Corporation.

³ A sandpit aims to collect experts from a range of fields, often for several days, to exchange ideas on a particular topic and build research proposals, with the expectation that a selection of them will be funded.

Figure 1.
The range of methods supplementing academic peer review



Review by researchers

The review of proposals by researchers is the most common decisionmaking approach, although some funders adopt an approach focussed on an internal committee. Nearly all funders reviewed included some form of academic peer review. The U.S. Department of Veterans Affairs and the Fonds de recherche du Québec–Santé are among the five funders who rely purely on peer review for funding decisions. In the majority of cases, however, peer review is supplemented by another form of review. Often funding decisions are made through a two-step process, whereby the scores or assessments from the peer reviewers serve as input to a panel which then decides on funding. Experts with alternative perspectives may be added to the peer review panel itself. These supplementary approaches take three forms, as outlined in the figure above.

Internal review panels: Among 11 of the funders interviewed, peer review scores or assessments feed into internal review panels. These panels can differ quite substantially in composition, but their function is usually to decide on which proposals will get funded based on the peer review input. Within the Canadian Institutes of Health Research (CIHR), for example, peer review scores and percentile rankings are used by the Chief Scientific Officer and Chief Financial Officer to make recommendations to the Science Council, which will decide on funding allocations. The Science Council ‘is chaired by the President and composed of

all 13 Scientific Directors, the Executive Management Team, the Director of Science, Knowledge Translation and Ethics and two non-voting ex-officio members’.⁴

External professionals: Two funders include external professionals in the process of making funding decisions. These external experts are professionals who can shed a different light on a proposal, usually from a services or implementation perspective. In the case of both the Ontario Mental Health Foundation and Movember, such external professionals are added to the academic peer review panel, generally to ensure that funded research is relevant to patients and the current services. While these external professionals may not form a panel of their own, their input is explicitly different from the academic input and thus distinguishes this method of decisionmaking from the strict academic peer review.

Academic expert panels: A number of funders use standing panels of academic experts to review the academic peer review input and decide on funding. Funders such as the Medical Research Council (MRC) (UK) and the Wellcome Trust use panels of researchers in particular areas to decide on the allocation of funding.

⁴ Canadian Institutes of Health Research. 2015. Science Council. As of 13 November 2015: <http://www.cihr-irsc.gc.ca/e/33807.html>.

Review by internal committee

Funding decisions do not always rely on a form of peer review. Five of the funders interviewed used a different method to decide on funding, one which mostly resembles decisionmaking by a committee. In some cases the committees are used in combination with some form of peer review, yet there are also examples of funders who rely solely on a committee. Pfizer, for example, as a private company, use multiple experts within the company to review what the main medical needs are and how the company can conduct research to address these. At the top level of the company, decisions are then made about the allocation of funding to different areas, including mental health. As second example is the Graham Boeckh Foundation, which consults internally on the research it would like to fund before it approaches researchers to request proposals.

Decisionmaking criteria

Not all funders publish the criteria on the basis of which funding decisions are made. Some funders, however, do provide detailed overviews of the criteria by which proposals are assessed by peer review. Below we illustrate the criteria used by the MRC and CIHR. These two organisations have been chosen as examples because they are large mental health research funders which provide extensive detail of their decisionmaking criteria on their respective websites.

The Medical Research Council: The Reviewers Handbook

The *Reviewers Handbook*⁵ of the MRC outlines in detail the assessment procedure and the assessment criteria of peer review. Reviews are based on three main criteria:

- Importance: How important are the questions, or gaps in knowledge, that are being addressed?

- Scientific potential: What are the prospects for good scientific progress?
- Resources requested: Are the funds requested essential for the work, and do the importance and scientific potential justify funding on the scale requested?

Depending on the exact scheme to which a proposal is submitted, reviewers will receive slightly different assessment criteria on the basis of which they will need to score a proposal. The possible criteria that could be included are summarised in the table below.

Criteria	Reviewers are asked to comment on, among other things
Research quality	<ul style="list-style-type: none"> • The competitiveness of the proposal • The level of innovation
Research environment and people	<ul style="list-style-type: none"> • The suitability of the group of researchers • The track record of the individual researchers
Resources requested	<ul style="list-style-type: none"> • The degree to which requested funds are essential and justified • The value for money of the proposal
Ethics	<ul style="list-style-type: none"> • The acceptability of the proposal in ethical terms • The clarity and acceptability of the ethical governance arrangements
Data management plans	<ul style="list-style-type: none"> • The potential of the applicant to manage the data soundly • The likely long-term value of the data
Impact	<ul style="list-style-type: none"> • The potential social and economic impact of the research • The plan to deliver the potential impacts

For certain schemes and grants, additional requirements are added to these criteria.

⁵ Medical Research Council. 2013. Reviewers handbook: A detailed guide for reviewers of proposals to the MRC. As of 13 November 2015: <http://www.mrc.ac.uk/documents/pdf/reviewers-handbook/>.

The Canadian Institutes of Health Research: The Peer Review Manual

CIHR's *Peer Review Manual*⁶ also provides guidance to peer reviewers as to how to assess and evaluate proposals. The criteria that peer reviewers are requested to consider are summarised in the table below.

Criteria	Reviewers are asked to comment on, among other things
Research approach	<ul style="list-style-type: none"> The clarity of the research question and the rationale for the approach and methodology The appropriateness of the research design and methods
Originality of the proposal	<ul style="list-style-type: none"> The originality of the research questions and methodologies proposed The scope for the creation of new knowledge
Applicant(s)	<ul style="list-style-type: none"> The qualifications and experience of the researchers proposed The past productivity of the researchers
Environment for the research	<ul style="list-style-type: none"> The availability of personnel, facilities and infrastructure The suitability of the environment to conduct research and provide for training
Impact of the research	<ul style="list-style-type: none"> The potential of the research to address a gap in health research/ the health care system The scope for the research to impact on the health of people in Canada and globally

The two examples show quite a few similarities between the criteria, which include research quality, feasibility and impact. As not all funders publish such guidelines or publish the criteria by which they assess proposals, it is often difficult to understand which criteria are used by reviewers. Given that many funders explicitly adopt in their mission statement a commitment to the funding of high-quality research, it can be expected that such criteria as quality, impact and the qualifications of the applicant feature more widely. Without explicit criteria, however, it is unclear which aspects weigh most heavily in many funders' decisionmaking.

Future plans

Very few of the funders we reviewed anticipated changing their reviewing system. Only the Movember Foundation, the Ontario Mental Health Foundation, beyondblue and CIHR indicated that they are likely to make changes to the way in which they make decisions on funding in the future. To support its aim of expanding its role as a knowledge-translation and -exchange broker, the Ontario Mental Health Foundation will start to recruit mental health services clients to peer review committees. In a similar vein, the Movember Foundation will continue to actively incorporate practitioners and mental health service professionals in the peer review panels it uses to inform funding decisions. The general aim of the Movember Foundation is also to improve knowledge translation and to ensure that research is relevant to mental health services. For similar reasons, beyondblue indicated that it expects increased involvement of internal staff in decisionmaking to complement peer review by researchers. CIHR is in the process of reforming its investigator-initiated programmes and peer review processes. This includes: using more structured criteria to improve transparency; including application triage; facilitating remote review to increase cost-effectiveness; and using face-to-face meetings to discuss applications with large variances in reviewer rankings.

This theme is one of six identified in the study 'Project Ecosystem: Mapping the global mental health research funding system', which mapped the global funding of mental health research between 2009 and 2014. The study built up a picture of who the major funders are, what kinds of research they support and how they relate to one another. The analysis was based on the funding acknowledgements on more than 220,000 journal papers from the global mental health research field, alongside 32 'deep dive' profiles of research funders in Canada, the UK and globally. The main report, deep dives and other accompanying documents are available from www.randeurope.org/mental-health-ecosystem.

⁶ Canadian Institutes of Health Research. 2015. CIHR peer review manual for grant applications. As of 13 November 2015: <http://www.cihr-irsc.gc.ca/e/4656.html>.

Strategy development

Key points

- Funders use a wide range of approaches to formulate strategy, from light touch internal discussions through to elaborate stakeholder consultations.
- There are two distinct types of strategy: response mode funders, whose strategy is to fund excellent science, and more targeted funders, who attempt to set more detailed, needs-driven priorities.
- Funding bodies that are largely or solely response mode funders tend to have less detailed and concrete future plans than do more targeted funders.
- Smaller funding bodies tend to do more targeted funding.
- Smaller funding bodies tend to use their funds to leverage other sources of funding to increase the impact of their activities.
- Larger funding bodies tend to have more complex, multi-level strategy formulation processes.

All the funding bodies we examined have stated long-term goals, and just over half of them have formalised their strategy in a public document. However, there is considerable variation in the centrality of mental health to those goals, the types of strategy, who influences those strategies and how the strategies were formulated.

Variety of funding remits

The place of mental health in each funder's strategy is affected by the remit of the funder. The remit of funders we examined varies from funders who focus on one specific mental health condition to those that fund a wide variety of research across all of science. We have split the variety of remits into seven categories, as shown in Table 1.

Types of strategies

Our funders had two types of strategies – response mode strategies and directed strategies. Response mode strategies aim to fund the highest quality

science in particular areas. The Wellcome Trust in large part pursues this type of strategy. In contrast, directed strategies try to determine the needs in a particular area and then support research that will address those needs. SMRI, OBI and MQ are examples of this latter type, being funders who seek out gaps in the mental health research field and put out specific funding calls, or even direct commissions, in an attempt to stimulate research in areas they see as being underfunded.

In our sample, and in our dataset more broadly, the government funders tend to be the larger funders. They also tend to be response mode funders, possibly because of the challenges for government funders in formulating long-term strategy (see 'Influence of government' below). Smaller foundations and charities tend to have more targeted, needs-driven strategies.

One result of response mode funding, noted by our funders, is that the balance of research is defined by the quality of applicants; therefore strong areas tend to grow stronger.

Table 1.
Range of funding remits identified from our ‘deep dive’ reviews as either intentionally or unintentionally supporting mental health research

Funding remit	Funding bodies from ‘deep dive’ reviews
Health research, including mental health research	NIHR, Wellcome Trust, MRC, CIHR, AIHS, VA, ZonMw, FRQS, BMBF, Pfizer, Lundbeck Foundation, Grand Challenges Canada, NHMRC
Health research in particular groups, including mental health research	Movember, Young and Well CRC
Mental health research	GBF, MQ, BBRF, FFM, MHRUK, OMHF, Alzheimer’s Association, NIMH
Brain-related research	OBI
Specific mental health conditions research	beyondblue, NIDA , SMRI
Health research in specific health conditions other than mental health; mental health research funded unintentionally	BHF
Research that is broader than just health research; mental health research funded unintentionally	ERC, NSF, CNPq, ESRC

The majority of the funding is investigator initiated, and in some cases that is law of the market, with funding distributions aligning with the strengths of the Canadian research landscape.¹

For general health funders this means that the amount of mental health research funded depends on the relative excellence of the mental health researchers in comparison to researchers in other fields. The allocation is not based on health need. Unchecked, this could lead to gaps in mental health research or in specific aspects of mental health research. Many of the funding bodies we examined regularly analyse the composition of their response mode funding to check for these effects – and some have a mechanism to support areas they see as falling behind (e.g. CIHR).

Some funding bodies, as part of their strategy, use their funds to leverage other sources of funding to support research in their particular area of interest or region. Funders that do this include AIHS, CIHR, Young and Well CRC and GBF.

Targeted funders tend to have more detailed strategies underpinning commissioned research. In these cases funds are generally targeted to nurture areas that are seen as underfunded or areas of

highest need, or in some cases to build on regional research strengths.

Strategy development

Unsurprisingly, large funding bodies tend to have more complex, multi-level decisionmaking processes than do the smaller funders we examined. There was also variety in the role of government and the diversity of stakeholders involved in the strategy-making process.

Influence of government

While the strategy of some government funding bodies (e.g. BMBF, NHMRC, OMHF, NIMH and NIDA) is shaped by other government activities, there are also government funding bodies with more independence from government decisionmaking (e.g. NIHR). Federal funders such as NIMH develop their strategies with consideration for efforts to coordinate around specific areas, such as autism or the needs of military personnel and veterans. Grand Challenges Canada’s strategy is to fund early-stage, high-risk activities that could, if successful, be transitioned or scaled up by other Canadian development agencies. To achieve this, they work closely with a number of Canadian institutions, including Canada’s International Development Research Centre; the Canadian Institutes

¹ CIHR interviewee

Figure 1.
Key strategies that funding bodies engaged in to incorporate stakeholders' expertise into their strategy development (blue = external stakeholders and green = internal stakeholders)



of Health Research; and the Department of Foreign Affairs, Trade and Development. Another form of coordination among funders is to coordinate the areas in which they overlap – for example, ESRC consults with other UK research councils to identify gaps and overlaps among them.

Because most government funders tend to be response mode funders and are often influenced by the priorities of government, they have less-developed long-term strategies.

Involvement of internal and external stakeholders

Funders' strategy development processes differed in how they combined external and internal views. Most processes included external input; however, the extent to which external stakeholders were

consulted varied. The key methods through which they were involved are shown in Figure 1.

Movember is a good example of a funding body with very specific targeted funding programmes and a developed approach to strategy development (see Box 1). The Graham Boeckh Foundation and MQ also take a structured and directed approach. MQ is developing its strategy through convening meetings of topic experts, consulting with patients and conducting data analysis and literature searches in order to identify the most promising avenues of research.

Other organisations that reach out to patients and the public include the VA, NIHR and MQ. NIHR seeks patient input through its website, and both NIHR and MQ take into consideration the findings of the large-scale surveys conducted by

Box 1. Movember

Movember updates its strategy by taking into account several factors. While maintaining a strong sense of the kind of impact they want to have, they survey the external environment to see what is being funded in the men's health space to identify issues that the organisation feels need further attention. They then consider where their expertise lies, consult with experts globally, sometimes commission literature reviews and analyse previous investments, and test the ideas with the people the organisation has relationships with globally.

the James Lind Alliance priority-setting partnerships. These surveys aim to identify the research priorities of patients, professionals and the public. The VA is focussed on the needs of one specific patient group, namely, veterans.

In contrast, OBI (see Box 2) and the Wellcome Trust focussed their consultation on the research community when developing their strategies, carrying out workshops with researchers across the province/country. Following the Wellcome Trust director's tour, the organisation introduced two new schemes: an early career researcher award and a collaborative research award.

How are strategies kept up to date?

In general, funders review and update their overall strategies periodically, ranging from every three to every five years. For example, CIHR has a two-layer strategy approach, with both a CIHR strategy and an institute-level strategy (for the Institute of Neurosciences, Mental Health and Addictions - INMHA) that are not formally synchronised. While the CIHR strategy is renewed every four years, the INMHA strategy is renewed approximately every five years or when a new Scientific Director starts. Increasingly, Institute strategic plans are aligned with overall CIHR strategy and major initiatives. INMHA may, however, focus some of its resources on gap areas that are felt to be important but underfunded. To allow flexibility for the new Scientific Director and because the INMHA strategy is influenced by the Scientific Director, the Institute goes into a 'transition mode' two years before the mandate of the current Scientific Director ends.

An alternative but less common model is pursued by NIHR, which does not produce formal

Box 2. Ontario Brain Institute

The OBI's 'Talk and listen' tour involved holding discussions with researchers across the province to establish what researchers thought would most effectively speed up research. OBI reviewed the discussions that took place and put out a request for researchers to submit letters of intent detailing a collaborative initiative for a particular disorder of the brain. OBI funded five such collaborative networks in subjects including depression and neurodegeneration. Its strategy is to fund brain-related research that supports collaborative initiatives where the findings can be collected in a specific manner that will enable interdisciplinary analysis of findings at different levels, described as a 'Rubik's cube' approach.

strategy reports but instead works on an iterative or 'living strategy' basis.

Strategy in industry and industry-linked funders

The strategy developed by the pharmaceutical company Pfizer differs considerably from that of other funding bodies examined in this study in that, in addition to considering the needs of patients, the company also examines the potential for a return on its investment. While the Lundbeck Foundation is not a pharmaceutical company and therefore does not have to consider the economic aspect in the same way as Pfizer, the Lundbeck Foundation does prioritise three areas of research reflecting the focus of the companies in which it is a major shareholder. However, these areas are only given preference if they are of high enough quality.

This theme is one of six identified in the study 'Project Ecosystem: Mapping the global mental health research funding system', which mapped the global funding of mental health research between 2009 and 2014. The study built up a picture of who the major funders are, what kinds of research they support and how they relate to one another. The analysis was based on the funding acknowledgements on more than 220,000 journal papers from the global mental health research field, alongside 32 'deep dive' profiles of research funders in Canada, the UK and globally. The main report, deep dives and other accompanying documents are available from www.randeurope.org/mental-health-ecosystem.

Types of funding

Key points

- The key funding mechanism used is the call for proposals, but other mechanisms are also used.
- Large government funders tend to use both open and more restricted calls for proposals, whereas charities and foundations tend to rely on restricted calls; they are likely to have a cause that restricts the scope of the call.
- There is a visible move towards more directed funding, whereby funders co-determine with researchers the research approach and topic that will be funded.

The funders in our sample allocated most of their support using four mechanisms: open calls for proposals, restricted calls for proposals, centres, and fellowships and chairs at universities. In this discussion we have made a distinction between response mode funders and targeted funders. Essentially the difference lies in the degree of freedom the researchers have to define the topic or problem they want to work on. Response mode funders, as the name suggests, respond to proposals they receive through largely unrestricted calls for proposals. Targeted funding is more restricted and implies, for example, a call for proposals in a particular area of research or on a particular problem. Among the mental health funders reviewed, there were funders who use a variety of funding approaches, from pure response mode, to a mix, to very directed. The ERC is recognised as a pure response mode funder. It believes that this model will produce the highest quality basic research.¹ The very different approach taken by, for example, the Movember Foundation reflects different priorities – in this case, a mission more closely linked to health improvement. The Movember Founda-

tion first selects areas of strategic importance; then it makes targeted investments.

We have distinguished four main types of funding in our sample:

1. **Grants through open calls for proposals:** Funders distribute grants to successful applicants on the basis of an open call for proposals. The scope of the call is broad and can encompass any type of (health) research. In the sample, this funding mechanism is mainly used by general government funding agencies.
2. **Grants through restricted calls for proposals:** In contrast to the open call for proposals, the restricted call does have a defined scope and focus. The degree to which the call can be defined differs, ranging from relatively unspecified (e.g. any type of research in dementia) to a more strategic call (e.g. work on an intervention for suicide prevention among young men).
3. **Centres/consortia:** Research centres are also used to distribute funding. While the selection of the centres may still occur through a competitive process set up by the funder, the funding of individual research projects is controlled by the research centres themselves. This type of funding therefore differs from the mechanism by which existing research centres apply for funding through calls for proposals.

¹ European Research Council. n.d. Mission. As of 13 November 2015: <https://erc.europa.eu/about-erc/mission>.

4. **Chairs, fellowships and other individual funding:** Apart from funding projects, funders also fund specific individuals through a number of programmes. These can include chairs at research institutions, fellowships, and doctoral students and post-doctoral fellows.

Although most funders use a combination of these four types of funding, the most frequently used mechanisms are open and restricted calls for proposals (see Table 1 below). We recognise that these four general labels mask a lot of diversity within these types (especially within the restricted grant group) and that they do not cover all new and innovative types of funding. A few funders fall outside these four groups.

Table 1.
Number of funders in our sample using each type of funding mechanism

Open grant	Restricted grant	Centres/ consortia	Chairs/ fellowships
18	24	12	20

Note: Because a funder can use multiple methods, the total exceeds the 32 funders interviewed.

ZonMW funding of consortia

From 2001 until 2012, ZonMW ran a large funding programme in mental health called GeestKracht (tr. MindPower). Through Geestkracht, funding was allocated to consortia of institutions in different areas of mental health research.

The selection of the consortia occurred on a competitive basis. Once funded, the consortia had substantial discretion to invest in research. An important requirement from the funder, however, was that the consortia build sustainable research infrastructure to ensure that mental health research would continue after 2012. The consortia differ from 'traditional' research centres in that they are formed by multiple and diverse institutions, including universities and mental health care providers.

The degree to which funders specify the focus of restricted calls for proposals differs. Some funders clearly identify the type of research they would like to fund, while others only indicate the area in which they would like to fund research. As such there appears to be a continuum of the degree to which the calls for proposals are restricted.

Figure 1 opposite provides three examples of the different types used by the funders reviewed. Several funders mentioned that they have either recently moved towards more restricted calls for proposals or are considering such a move. Reasons mentioned for this change in approach, by, for example, the Movember Foundation and beyondblue, varied from a desire to better align the research funded with the mission of the funder, to having more involvement with actual research design.

Innovative funding models

A number of the funders we reviewed discussed experimenting with new types of funding. The Movember Foundation develops collaborations with community partners to identify research projects with a very direct link to the mental well-being of boys and men. Working with community partners, the foundation invites organisations to submit proposals for research or for the evaluation of existing interventions working with men and boys. Through this approach, Movember hopes to identify the research questions most relevant to the mental well-being of men and boys.

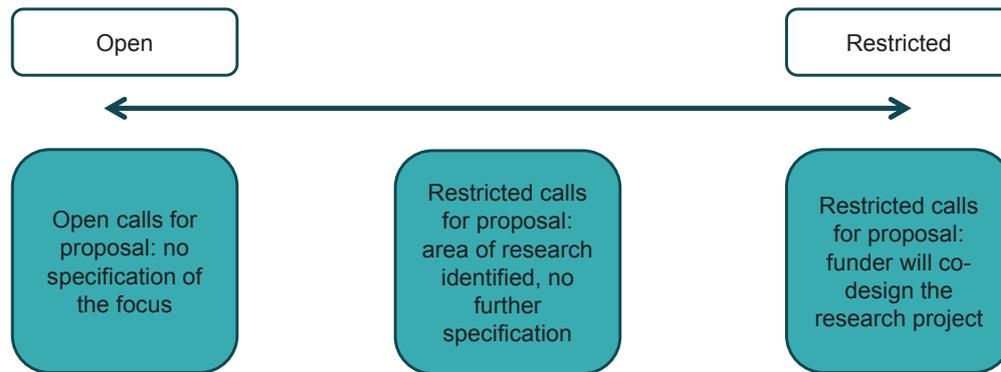
The 'sandpit' is an example of an innovative type of funding being explored by the National Science Foundation (NSF) (USA) in the context of funding mental health research. Sandpits bring together experts in a field, often for several days, to exchange ideas on a particular topic. The outcome of the sandpit may be a research proposal or a new call for proposals. The idea has previously been used in the UK, where it was developed by the EPSRC.²

Translational funding

There also appears to be a growing interest among funders in 'translational' research. Of the 32 funders studied through the 'deep dives', 21 explicitly mentioned the availability of funds for translational activities. However, there are substantial differences between funders as to what they consider to constitute translational funding. While

² Engineering and Physical Sciences Research Council. n.d. Sandpits. As of 13 November 2015: <https://www.epsrc.ac.uk/funding/howtoapply/routes/network/ideas/whatisasandpit/>.

Figure 1.
Open–restricted spectrum of calls for proposals



most funders use the term translational research to refer to the further development of a drug or intervention to get it ready for market or implementation, our impression is that other funders think of it as the dissemination and implementation of findings after research has been completed. Because funders tend not to provide explicit definitions of their understanding of the term, it is hard to compare their approaches.

Two examples of translational funding that fit into the first definition are the European Research Council and the National Institute of Mental Health (USA). The European Research Council provides ‘proof-of-concept’ grants that ERC-funded researchers can use to explore the market potential of their results. The National Institute of Mental Health houses a Division of Translational Research, which is explicitly tasked with the translation of knowledge acquired through basic research into interventions.

An example that fits into the second definition of translational funding is Movember, which

explicitly provides funding for the ‘translation’ and adoption of existing research findings into practice. Such ‘knowledge translation’ (KT) is an explicit part of every research project, and each project drafts a KT strategy to outline how this will be achieved.

This theme is one of six identified in the study ‘Project Ecosystem: Mapping the global mental health research funding system’, which mapped the global funding of mental health research between 2009 and 2014. The study built up a picture of who the major funders are, what kinds of research they support and how they relate to one another. The analysis was based on the funding acknowledgements on more than 220,000 journal papers from the global mental health research field, alongside 32 ‘deep dive’ profiles of research funders in Canada, the UK and globally. The main report, deep dives and other accompanying documents are available from www.randeurope.org/mental-health-ecosystem.



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RR-1271/1-GBF