



Implementation of online psychosocial interventions for people with neurological conditions and their caregivers: A systematic review protocol

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Abstract

Background: As the burden of neurological conditions increases globally, online psychosocial interventions offer a potentially scalable solution to enabling healthcare access. However, their successful development and implementation require research into electronic healthcare implementation specifically.

Methods: Using a search strategy combining the concepts of implementation, electronic healthcare, psychosocial interventions and neurological conditions, we will conduct comprehensive electronic searches for primary implementation evidence in MEDLINE, EMBASE, PsycINFO, CINAHL, Scopus, SpeechBITE and NeuroBITE databases. Included studies will be analysed according to the Non-adoption, Abandonment, Scale-Up, Spread, and Sustainability framework, appraised using the Mixed-Methods Appraisal Tool and evaluated for theoretical underpinning in implementation science, with hybrid studies of effectiveness-implementation research classified according to the type of hybrid design.

Discussion: This review will be the first to use a theoretical underpinning in the Non-adoption, Abandonment, Scale-Up, Spread, and Sustainability framework to evaluate strengths and gaps in existing implementation research into online psychosocial interventions for people with neurological conditions and/or their caregivers. The results may be useful to provide direction and recommendations for future clinical implementation and research into online psychosocial interventions for people with neurological conditions and/or their caregivers.

Systematic review registration: PROSPERO 2020: CRD42020186387.

Keywords

Implementation science, internet interventions, brain injuries, traumatic, delivery of health care, caregivers

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Background

It is estimated that almost a sixth of the world's population, or one billion people globally, currently live with acquired neurological conditions including stroke and traumatic brain injury (TBI).¹ Since the prevalence of neurological conditions steeply increases with age, globally ageing and growing populations will present governments worldwide

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with rising demand for treatments, rehabilitation and support services for these conditions.¹

People with neurological conditions commonly present with cognitive, behavioural and psychological symptoms^{2–5} and communication impairments^{6,7} that can have enduring psychosocial impacts. For directly affected individuals, these include difficulties with mental health,^{8–10} employment^{11,12} and social participation and relationships.^{12–16} For families, significant others and wider communities, these include the health, psychosocial^{17,18} and economic burden of caregiving.¹⁹ The growing global burden of neurological conditions thus creates an increasing need for psychosocial interventions that provide cognitive, behavioural, educational, communication and/or supportive care to both the person with the condition and/or their caregivers. However, delivery of and access to these essential interventions continues to present a challenge for healthcare systems^{20,21} as well as to potential recipients²² and their caregivers.²³

A potentially scalable solution is to enable online access to psychosocial interventions. Online psychosocial interventions and service delivery models involve targeting psychosocial needs at a distance over the internet as a form of electronic healthcare (eHealth), either as an alternative, adjunct or in combination with face-to-face delivery.²⁴ This approach has been pioneered by the discipline of psychology for both traditionally established and online-first interventions,²⁴ with promising recent data that this service delivery model can improve service reach to a diverse cross-section of groups who otherwise under-utilise health services or do not seek care at all, including indigenous populations, people of lower socio-economic status and those from rural and remote regions.^{25,26}

An analogous online service delivery approach for people with neurological conditions and their caregivers could be promising for a number of reasons. Firstly, adults with stroke and TBI frequently use home-based digital therapy for cognitive and language rehabilitation, with particularly high usage recorded in areas with limited access to clinical services.²⁷ Additionally, online service delivery may be acceptable to clinicians²⁸ and especially suitable for caregivers, who desire support that transcends geography.²⁹ There is a well-established and diverse body of literature exploring psychosocial interventions for dyads delivered online with partial automatised,³⁰ however, the potential to automatised intervention components into self-directed content that complements telehealth interaction with the clinician is yet to be explored for neurological populations. Caregiver acceptance of dyadic online psychosocial interventions that support both the caregiver and the person with the condition has also rarely been investigated.³⁰

There is therefore a gap in knowledge of whether scalable and sustainable online psychosocial interventions can be successfully implemented in everyday clinical

environments for people with neurological conditions and their communities. Addressing this gap requires implementation research in addition to efficacy and effectiveness trials,²⁴ because even clinically effective eHealth interventions frequently fail to be sustained in the long term.^{31,32} Implementation success and failure frequently depends on critical factors such as intervention costs and workflow changes,³³ or the sustainability of their business models,³² rather than clinical outcomes. A specific focus on implementation has therefore been recommended for future research into online psychosocial interventions, especially in early co-design stages with potential end-users.^{24,25}

Although eHealth implementation frameworks and theories can guide researchers in obtaining this implementation knowledge,³⁴ eHealth implementation research to date has relied on general rather than eHealth-specific implementation theories,³⁵ which are often ill-fitting for eHealth interventions.³⁶ It is therefore essential to use an eHealth-specific implementation framework, such as the Non-adoption, Abandonment, Scale-Up, Spread, and Sustainability (NASSS) framework^{37,38} which synthesises multiple theories of technology implementation, including theories of sociotechnical systems, technological adoption and user-centred design.³⁹ Given much existing published literature has focused on organisational issues in a way that has neglected the wider social context of novel technologies,⁴⁰ we also identified the need for the NASSS framework's inclusion of key factors such as organisational capacity for ongoing innovation and change,²⁵ changes to workflow and clinical processes^{25,33} and the critical importance of political and regulatory context.²⁵ Moreover, because eHealth interventions will be implemented in the complex, adaptive system of healthcare, the unpredictable nature of interactions between different factors and agents in healthcare and eHealth implementation³⁸ is accommodated by the NASSS framework's foundation in the overarching theory of complex adaptive systems.³⁹ Identifying and understanding this complexity of eHealth implementation is essential to ensuring scalable, sustainable, successful implementation of online psychosocial interventions in real-world settings.

The aim of this review is therefore to identify and understand the nature of current eHealth implementation evidence concerning psychosocial interventions for people with neurological conditions and their caregivers, to inform both the implementation and development of such interventions. To the best of our knowledge, it would be the first review to summarise this evidence through the deductive use of an eHealth-focussed implementation framework. Therefore, the specific aims of this review are to (i) identify published, peer-reviewed primary evidence of implementation outcomes, strategies or factors for online psychosocial interventions, targeting either individuals with neurological conditions and/or their formal or informal caregivers; (ii) evaluate and summarise the

strength and nature of this evidence; (iii) synthesise the qualitative and quantitative data according to eHealth implementation theory; and (iv) provide recommendations for future implementation of online psychosocial interventions for individuals with neurological conditions and/or their formal or informal caregivers based on this synthesis.

Methods

This systematic review was submitted for registration with the International Prospective Register of Systematic Reviews (PROSPERO) on the 25th of May 2020. The methods selected were guided by the Preferred Reporting Items for Systematic reviews and Meta-Analyses for Protocols (PRISMA-P⁴¹). Any amendments to the protocol will be documented according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement for reporting systematic reviews.⁴²

Databases

Comprehensive electronic searches will be conducted in the following electronic databases; (i) Medical Literature Analysis and Retrieval System Online (MEDLINE, via Ovid), (ii) Excerpta Medica dataBASE (EMBASE, via Ovid), (iii) Psychological Information Database (PsycINFO, via EBSCOhost), (iv) Scopus (via Elsevier), (v) the Cumulative Index to Nursing and Allied Health Literature (CINAHL, via EBSCOhost), (vi) the Speech Pathology Database for Best Interventions and Treatment Efficacy (speechBITE) and (vii) the Neurorehabilitation Database of Brain Impairment Treatment Efficacy (NeuroBITE).

Search strategy

The search strategy will be based on four concepts; implementation, eHealth, psychosocial intervention and neurological conditions. We identified that previous systematic reviews had focussed on each of these concepts in different combinations, such as online psychosocial dyadic interventions³⁰ or eHealth implementation barriers and facilitators³³. Our search therefore targets the overlap of all four concepts. The search strategy will include a combination of subject headings, keywords and free-text words pertaining to each concept. Results will be combined using the appropriate Boolean operators (AND, OR). An example search strategy for the CINAHL database is outlined in Table 1.

The concept of eHealth typically encompasses one or multiple domains including electronic management systems such as electronic medical records or e-prescribing; communication systems such as telemedicine, telehealth and home telecare systems; and computerised decision support or information systems.⁴³ For the purpose of

most directly informing implementation of online psychosocial interventions, the concept of 'eHealth' in our search strategy will focus on communication systems such as telemedicine, telehealth and home telecare systems, and specifically, psychosocial interventions as a subset within this classification. Thus, our search strategy will not include electronic management systems such as electronic medical records, e-prescribing, computerised decision support systems or information systems. Given the extensive nature of this literature,⁴³ this exclusion is also necessary to ensure a manageable volume of studies. Acknowledging that the implementation literature for these technologies has the potential to offer transferable insights, the underpinning of the NASSS framework in eHealth implementation theories based on and applicable to these types of eHealth may compensate for this exclusion while ensuring a manageable, relevant review scope.

A distinctive feature of the current eHealth literature is its fluid boundaries and numerous overlapping definitions, which is both a key limitation of studying eHealth and a characteristic of the field.⁴⁴ Terminology and definitions in the literature vary widely,^{44,45} as subtle as 'internet' versus 'web-based' or 'online', as well as regional differences such as 'telehealth' versus 'telepractice'. These will be included as search synonyms as far as the authors are aware from prior knowledge and preliminary searches, and through consultation with a health librarian. Additionally, eHealth implementation literature contains a wide variety of implementation science terminology which can make it challenging to review.³⁵ Therefore, we will include as many relevant implementation science synonyms as known or identified by the authors from previous literature and preliminary searching.

Study selection

Screening of results will be managed using Covidence software.⁴⁶ Due to Covidence's currently known errors in managing duplicates,⁴⁷ the first author will first use Bramer and colleague's deduplication method⁴⁸ in EndNote reference management software⁴⁹ to remove duplicate records, and manually check for duplicates before importing into Covidence. Covidence's automatic deduplication at import will then be manually checked again. The first and second authors will then independently assess the eligibility of all unique records based on titles and abstracts, with consensus discussion with a third team member when necessary. The first author will then obtain full-text papers of references deemed potentially eligible and both authors will assess full texts for eligibility against the pre-specified selection criteria. Any discrepancies between reviewers will be resolved through discussion with each other and the research team where necessary. Reasons for exclusion at this stage will be recorded in Covidence software and reported according to

Table 1. Example search strategy for the four broad concept categories of neurological conditions, implementation, eHealth and psychosocial intervention in CINAHL.

Concept category (combined with AND)	Search terms (combined with OR)
Implementation	implement* OR effectiveness-implementation OR disseminat* OR diffus* OR utili* OR sustainab* OR uptake* OR facilitat* OR barrier* OR ((knowledge or research or technology) AND (translat* OR transform* OR exchange OR transfer OR integration OR utili?ation)) OR scalab* OR 'Process evaluation' OR 'process measure*' OR Feasib* OR adopt* OR adapt* OR usab* OR 'lessons learned' OR implications OR experiences OR interoperab* OR fail* OR succes* OR acceptab* OR appropriate* OR fidelity OR adhere* OR complian* OR penetration OR cost* OR satisfaction OR hybrid OR pragmatic OR co-design OR codesign OR participatory* OR (MH 'Cost Benefit Analysis') OR (MH 'Action Research') OR (MH 'Health Care Costs') OR (MH 'Costs and Cost Analysis') OR (MH 'Systems Implementation') OR (MH 'Implementation Science') OR (MH 'Program Implementation')
eHealth	telehealth OR tele-health OR telepractice OR tele-practice OR mHealth or m-Health OR 'health telematics' OR tele-medicine OR computeri?ed OR internet-delivered OR internet-based OR online OR web-based OR 'digital health' OR e-health OR ehealth OR 'wireless health' OR e-therapy OR urtherapy OR 'healthcare technology' OR e-rehabilitation OR erehabilitation OR 'User-Computer Interface' OR 'digital therapy' OR 'digital therapeutic*' OR e-mental OR emental OR 'digital mental health' OR (MH 'telehealth+')
Psychosocial interventions	((behavio#ral OR behavio#r OR cognitive OR 'cognitive behavio#ral' OR psychoeducation* OR psycho-education* OR psychosocial OR dyad* OR group OR family OR caregiver OR 'communication partner') AND (therapy OR intervention OR medicine OR training OR treatment OR program OR rehabilitation OR coaching)) OR (MH 'Cognitive Therapy') OR (MH 'Caregiver Emotional Health (Iowa NOC)') OR (MH 'Mental Health Organizations') OR (MH 'Community Mental Health Services') OR (MH 'Rehabilitation, Cognitive') OR (MH 'Mental Health Services') OR (MH 'Cognitive Therapy (Iowa NIC)')
Neurological conditions	stroke OR 'cerebrovascular accident' OR CVA OR (MM 'Stroke Patients') OR (MH 'Stroke')OR 'traumatic brain injury' OR (MM 'Head Injuries+') OR 'head injury' OR 'brain injury' OR TBI OR neurotrauma OR (MH 'Brain Injuries+') OR (MM 'Right Hemisphere Injuries') OR (MM 'International Brain Injury Association') OR 'brain injury' OR (MM 'Left Hemisphere Injuries') OR (MM 'Aphasia+') OR 'aphasia' OR 'dysphasia' OR 'Primary Progressive Aphasia' OR (MM 'Dementia+') OR 'dementia' OR (MM 'Huntington's Disease') OR 'huntington*' OR (MM 'Alzheimer's Disease') OR 'alzheimer*' OR (MM 'Parkinson Disease') OR 'parkinson*' OR 'motor neuron# disease' OR 'mnd' OR (MM 'Motor Neuron Diseases+') OR (MM 'Multiple Sclerosis+') OR 'multiple sclerosis' OR (MM 'Migraine') OR 'migraine' OR (MM 'Meningitis+') OR 'meningitis' OR(MM 'Brain Neoplasms+') OR 'brain cancer' OR 'brain tumo#r' OR (MM 'Meningitis+') OR 'meningitis' OR(MM 'Encephalitis+') OR 'encephalitis' OR (MM 'Tetanus') OR 'tetanus' (MM 'Epilepsy+') OR 'epilepsy'

MH: major and minor headings; MM: major headings; CINAHL: cumulative index to nursing and allied health literature.

the PRISMA.⁴² We will identify and include forward citations of results papers for protocols that meet eligibility criteria, backward citations of implementation studies related to efficacy studies meeting eligibility criteria, and hand-searching as required. In the case of a very low yield, snowball searches may also be conducted.

Eligibility criteria

Studies will be included according to the following pre-determined eligibility criteria. First, they must be published

(online or in print) peer-reviewed primary evidence, with unpublished and grey literature (i.e. non-peer-reviewed), works excluded. Studies will only be considered from 2008, as a prior systematic review of eHealth implementation for chronic illness has established that both eHealth and implementation literature were in their infancy during this period and the authors found no peer-reviewed eHealth implementation literature prior to 2008.³⁵ The review will also be limited to the English language as the reviewers' primary literate language. However, we note that the authors of a recent systematic review of eHealth

implementation for chronic illnesses were able to review evidence in both English and Scandinavian languages, with all of the final 12 included studies published in English.³⁵ We therefore expect an English-language review will still be able to include a substantial and therefore meaningful proportion of the relevant literature. Eligibility will then be determined based on the Population, Intervention, Comparison, Outcome, Study design framework as follows:

Population. Eligible studies must enrol or describe the enrolment of (i) people identified to have a degenerative or chronic acquired neurological condition, including the most globally prevalent neurological conditions¹ that are recognised to affect cognitive communication (i.e. stroke, Alzheimer's and other dementias, TBI, migraine, encephalitis, meningitis, tetanus, Parkinson's disease, multiple sclerosis, motor neuron diseases, epilepsy and brain cancer), and/or (ii) a caregiver who provides either informal, unpaid care to the person or formal, trained health care (e.g. a health professional or an assigned trained peer mentor) to people with such conditions. Therefore, both dyadic and individual interventions can be included, including both parents in a parent-child dyad for paediatric interventions.

Intervention. Included interventions must be psychosocial in nature; that is, providing cognitive, behavioural, educational, communication and/or supportive care to the person with the neurological condition and/or a caregiver. Therefore, we will exclude interventions that are not psychosocial in nature, such as pharmacological, physical or surgical interventions.

Additionally, the primary aim of the intervention must be to address symptom management of the care recipients' neurological condition, such as their communication or behaviour. Therefore, we will exclude studies of interventions with the primary objective of improving a couple's or family dyad's relationship without measuring any behavioural or communication outcomes.

Finally, more than 50% of the intervention must be delivered online. This could include either or both mobile/tablet and web-based delivery. We will include interventions that are partially or fully automatised in their delivery, as well as those that use the technology to deliver standard clinician-provided care (e.g. a therapist providing face-to-face therapy via video). We will exclude interventions where more than 50% of the intervention is delivered via telephone calls.

Outcome. Studies will be eligible for inclusion if they report quantitative or qualitative measures of implementation outcomes, strategies or factors for the intervention. Therefore, we will include hybrid study designs which report both objective or self-report psychosocial or health outcomes for the care recipient and/or the caregiver and at least one

implementation outcome, factor or strategy, as well as purely implementation-focused studies. However, we will exclude studies that report clinical or patient-reported outcomes only and do not examine any implementation factors, strategies or outcomes at the full-text level. We acknowledge that not all included studies are likely to have implementation aspects as their primary focus, and are thus most likely to be hybrid implementation-effectiveness studies which may overlook or omit some aspects of implementation, or even fail to be overtly reported as implementation studies at all.⁵⁰ We will manage these challenges where necessary by proceeding to full-text review for clinical studies returned by our search strategy and using critical consensus discussion among the research team when needed.

Study design and comparators. We will include peer-reviewed, published studies quantitatively or qualitatively reporting implementation factors, strategies or outcomes for online psychosocial interventions. This includes hybrid design trials with implementation factors, outcomes or strategies reported either primarily (i.e. Hybrid III design⁵⁰), alongside (i.e. Hybrid II design⁵⁰) or while primarily testing clinical effectiveness (i.e. Hybrid I design⁵⁰). For hybrid trials examining effectiveness or efficacy alongside implementation, all trial designs will be eligible for inclusion, including single-arm trials, feasibility trials, randomised controlled trials (RCTs) and patient preference trials (e.g. a care recipient is able enrol in an intervention with or without a caregiver, or nominate whether to receive telehealth only or both automatised and telehealth delivery). We do not intend to limit the type of comparison condition in RCTs, and we will include waitlist control conditions as usual care for the purposes of this review. Additionally, all study analytic designs will be eligible for inclusion, including long-term follow-up and secondary analyses of trial data.

We will also include records that exclusively discuss implementation factors and strategies at the intervention development stage, and thus do not yet report intervention or implementation outcomes. Therefore, we will consider research protocols as well as prospective and retrospective studies.

Theoretically-based data extraction

Two reviewers (the first and second authors) familiar with the NASSS framework via its key publications^{37–39} will independently extract information from the selected eligible studies using a standardised, pre-determined electronic form (see Table 2 as an example) administered through Research Electronic Data Capture (REDCap⁵¹). The form will query (i) bibliographic information about the article, such as title, authors and DOI, (ii) summary information about the study population and design, (iii) evidence appraisal and (iv) qualitative and quantitative data about

Table 2. Proposed data extraction form, to be refined as part of an iterative approach to extraction.

Question category	Question	Response	Additional notes/ comments
Bibliographic information	1. Study title		
	2. First author surname		
	3. Publication year		
	4. DOI URL		
Summary	5. What is the target condition? (select all that apply)		
	(a) TBI		
	(b) Stroke/CVA		
	(c) Dementia		
	(d) Alzheimer's disease		
	(e) Huntington's disease		
	(f) Parkinson's disease		
	(g) Primary progressive aphasia		
	(h) Motor neuron disease		
	(i) Multiple sclerosis		
(j) Other (please specify)			
6. What is the psychosocial intervention?			
(a) CBT			
(b) CPT			
(c) Other (please specify)			
7. How is the intervention delivered?			
(a) Web-based			
(b) Mobile			
(c) Both			
8. Does the intervention include:			
(a) Person with the condition only			
(b) Both caregivers and the person with the condition			
(c) Caregivers only			
9. Which population has the condition?			
(a) Adult			
(b) Adolescent			
(c) Paediatric			
10. What is the setting:			
(a) Home			
(b) School			
(c) Community health			
(d) Hospital			
(e) Other:			

(continued)

Table 2. Continued.

Question category	Question	Response	Additional notes/ comments
	11. Is the intervention		
	(a) Completely clinician-led, i.e., telehealth only (b) Partially automatised, partly telehealth (c) Completely automatised/self-guided		
Evidence appraisal	12. Please specify		
	(a) sample size (i) of person with the condition (ii) of caregivers (b) study design (i) Qualitative (ii) Quantitative RCT (iii) Quantitative non-randomised (iv) Quantitative descriptive (v) Mixed methods		
	13. MMAT		
Implementation	14. What implementation outcome measures were included? (select all that apply)		
	(a) Feasibility (b) Usability (c) Acceptability (d) Adherence (e) Fidelity (f) Satisfaction (g) Other (please specify)		
	15. Implementation study design:		
	(a) Hybrid Type 1 (b) Hybrid Type II (c) Hybrid Type III (d) Qualitative study (e) Other, please specify:		
	16. What was the scope of implementation?		
	(a) Single site (b) Multiple sites (c) State (d) National (e) International		
	17. Did the authors use an implementation framework or theory?		
	18. If yes, please specify:		

(continued)

Table 2. Continued.

Question category	Question	Response	Additional notes/ comments
	19. If yes, was it used to inform: <ul style="list-style-type: none"> (a) Intervention development (b) Inform study design (c) Inform outcome measures (d) Data analysis/interpretation (e) Other (please specify) 		
	20. Were individuals with the condition, caregivers or clinicians involved in: <ul style="list-style-type: none"> (a) Co-design of the intervention (b) Co-design of the research (c) Evaluation of the intervention (d) Other (please specify) 		
	21. If yes, please describe how		
NASSS Domain 1	22. What is/are <ul style="list-style-type: none"> (a) the nature, (b) relevant co-morbidities and socio-cultural factors of the condition? 		
Domain 2	23. What were the <ul style="list-style-type: none"> (a) key features of the technology? (b) kinds of knowledge generated or made visible by the technology? (c) knowledge and supports required to use the technology? (d) technology supply model? (e) owners of the intellectual property generated by the technology? 		
Domain 3	24. What was the: <ul style="list-style-type: none"> (a) supply-side value proposition of the intervention? (b) demand-side value proposition of the intervention? 		
Domain 4	25. What assumptions and requirements were made of <ul style="list-style-type: none"> (a) Clinicians, i.e., What changes in staff roles, practices and identities are implied? (b) Clients, i.e., What is expected of the patient (and/or immediate carer) – and is this achievable by and acceptable to them? (c) Caregivers, i.e. What is assumed about the extended network of lay carers? 		
Domain 5	26. In the organisation, <ul style="list-style-type: none"> (a) What is the organisation's capacity to innovate? (b) How ready is the organisation for this technology-supported change? (c) How complex is the adoption and funding decision? (d) What changes will be needed in team interactions and routines? (e) What work was involved in implementation and who did it? 		

(continued)

Table 2. Continued.

Question category	Question	Response	Additional notes/ comments
Domain 6	27. What was the (a) political, (b) regulatory, (c) professional, (d) socio-cultural and (e) inter-organisational context of implementation?		
Domain 7	28. How much scope is there for adapting and co-evolving the technology and the service over time? 29. How resilient is the organisation to handling critical events and adapting to unforeseen eventualities?		

TBI: traumatic brain injury; CBT: cognitive behaviour therapy; MMAT: mixed-methods appraisal tool; NASSS: non-adoption, abandonment, scale-up, spread, and sustainability framework; RCT: randomised controlled trial; CPT: communication partner training; CVA: cerebrovascular accident.

the seven domains of the NASSS framework as summarised below:

1. nature, co-morbidities and socio-cultural factors of the neurological condition;
2. features, requirements and supports provided to use the technology;
3. supply-side and demand-side value proposition of the intervention;
4. assumptions and requirements made of clinicians, clients and caregivers;
5. organisational capacity to support implementation, innovation and change;
6. political, regulatory, professional, socio-cultural and inter-organisational context of implementation;
7. resilience and adaptiveness of the system in which the intervention will be implemented.

Any issues will be resolved with reference to the original publications outlining the NASSS framework,^{37–39} and through critical consensus discussion between reviewers and with the research team. If required, we will make email contact twice with corresponding authors to clarify unclear information or obtain missing data before considering such data unobtainable, and will report any missing data in our synthesis.

Evidence appraisal

While the primary aim of this review will be to synthesise the body of evidence according to the NASSS framework, the secondary aim will be to evaluate the current body of

evidence. Evidence will be appraised in the following ways: (i) whether the study used an implementation framework or theory, (ii) classifying any clinical trials as type I, II or III implementation-effectiveness hybrid studies^{50,52} and assessing risk of bias according to the Mixed-Methods Appraisal Tool (MMAT⁵³), supplemented by other design-specific tools where necessary, such as the Critical Appraisal Skills Programme (CASP⁵⁴), as well as potential biases at the outcome, study or publication level.

Analysis

As implementation research is highly heterogeneous and in its relative infancy as a field, it is expected that implementation interventions, outcome measures and study populations will be too heterogeneous to conduct a meta-analysis. If so, findings will be tabulated and a narrative synthesis will be performed examining implementation strategies, factors and outcomes according to the seven domains of the NASSS framework.^{37–39}

Discussion

By using the NASSS framework to systematically examine the implementation literature concerning online psychosocial interventions for neurological conditions, we expect our review to highlight future directions and recommendations for the implementation of these interventions. However, our use of the NASSS framework as a theoretical underpinning for extraction and analysis has both benefits and consequences. A framework such as the NASSS inherently provides a predefined perspective through which research

problems can be analysed.⁵⁵ This deductive approach may therefore fail to detect implementation issues not specifically itemised by the framework. However, the use of the NASSS framework remains an important strength of our methodology. As other eHealth implementation frameworks focus primarily on organisational issues to the neglect of wider contextual factors,⁴⁰ the NASSS framework prompts new examination of implementation issues that have not traditionally been considered, such as intervention's business case or political and regulatory implementation context. Therefore, a benefit of using such a comprehensive framework is the potential to systematically evaluate the strengths and gaps in the current implementation literature using a published theoretical approach that itself has the potential to be extended and amended by the scientific community. However, while the comprehensiveness and detail of the NASSS framework are necessary to guide our attempts to attend to, understand and reduce the complexity of different domains of eHealth implementation, this level of detail may also pose challenges to the feasibility of the review, potentially requiring the scope to be adjusted accordingly.

In summary, this review will be the first to use the theoretical underpinning of the NASSS framework to systematically evaluate the strengths and gaps in the current implementation literature pertaining to online psychosocial interventions for neurological conditions. The results may be useful to provide direction for further research and recommendations for the future implementation of online psychosocial interventions for people with neurological conditions and their formal and informal caregivers.

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Contributorship: MM selected the theoretical underpinning of this research, devised the search strategy and data extraction template and registered the review with critical revisions by EP, RR, MB and LT. MM prepared the manuscript and EP, RR, MB and LT critically revised the manuscript. All authors approved the final version of the manuscript for submission.

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