

An Umbrella Review of Self-Management Interventions for Health Conditions With Symptom Overlap With Traumatic Brain Injury

Angelle M. Sander, PhD; Monique R. Pappadis, PhD; Tamara Bushnik, PhD; Nancy D. Chiaravalloti, PhD; Simon Driver, PhD; Robin Hanks, PhD; Kirk Lercher, MD; Dawn Neumann, PhD; Amanda Rabinowitz, PhD; Ronald T. Seel, PhD; Erica Weber, PhD; Rick K. Ralston, MS; John Corrigan, PhD; Kurt Kroenke, PhD; Flora M. Hammond, MD

Objective: To synthesize evidence for the effectiveness of self-management interventions for chronic health conditions that have symptom overlap with traumatic brain injury (TBI) in order to extract recommendations for self-management intervention in persons with TBI. **Design:** An umbrella review of existing systematic reviews and/or meta-analyses of randomized controlled trials or nonrandomized studies targeting self-management of chronic conditions and specific outcomes relevant to persons with TBI. **Method:** A comprehensive literature search of 5 databases was conducted using PRISMA guidelines. Two independent reviewers conducted screening and data extraction using the Covidence web-based review platform. Quality assessment was conducted using criteria adapted from the Assessing the Methodological Quality of Systematic Reviews-2 (AMSTAR-2). **Results:** A total of 26 reviews met the inclusion criteria, covering a range of chronic conditions and a range of outcomes. Seven reviews were of moderate or high quality and focused on self-management in persons with stroke, chronic pain, and psychiatric disorders with psychotic features. Self-management interventions were found to have positive effects on quality of

Author Affiliations: H. Ben Taub Department of Physical Medicine & Rehabilitation, Baylor College of Medicine and Harris Health System, Houston, Texas (Dr Sander); Brain Injury Research Center, TIRR Memorial Hermann, Houston, Texas (Drs Sander and Pappadis); Department of Population Health and Health Disparities, School of Public and Population Health, and Sealy Center on Aging, The University of Texas Medical Branch (UTMB) (Dr Pappadis); Rusk Rehabilitation and NYU Langone Health, New York City, New York (Dr Bushnik); Kessler Foundation, East Hanover, New Jersey (Drs Chiaravalloti, Weber, and Lercher); Department of Physical Medicine and Rehabilitation, Rutgers-New Jersey Medical School, Newark (Drs Chiaravalloti, Weber, and Lercher); Department of Physical Medicine and Rehabilitation, Baylor Scott and White Institute for Rehabilitation, Dallas, Texas (Dr Driver); Baylor Scott and White Research Institute, Dallas, Texas (Dr Driver); Department of Physical Medicine and Rehabilitation, Wayne State University, Detroit, Michigan (Dr Hanks); Department of Physical Medicine and Rehabilitation (Drs Neumann and Hammond), Ruth Lilly Medical Library (Mr Ralston), and Department of Medicine (Dr Kroenke), Indiana University School of Medicine, Indianapolis; Rehabilitation Hospital of Indiana, Indianapolis (Drs Neumann and Hammond); Moss Rehabilitation Research Institute, Elkins, Pennsylvania (Dr Rabinowitz); Department of Physical Medicine and Rehabilitation, Thomas Jefferson University Philadelphia, Pennsylvania (Dr Rabinowitz); Department of Physical Medicine and Rehabilitation, Virginia Commonwealth University, Richmond (Dr Seel); Department of Physical Medicine & Rehabilitation, The Ohio State University, Columbus (Dr Corrigan); and Regenstrief Institute, Indianapolis, Indiana (Dr Kroenke).

The contents of this publication were developed under grants from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR) grant no. 90DPHF0006 [PIs: Hammond and Corrigan], and the National Institutes of Health's National Institute on

Aging (NIH/NIA) grant no. K01AG065492 [PI: Pappadis]. NIDILRR is a center within the Administration for Community Living (ACL), Department of Health and Human Services (HHS). The contents of this publication are solely the responsibility of the authors and do not necessarily represent the policy or official views of NIDILRR, ACL, NIH/NIA, HHS, and you should not assume endorsement by the federal government.

The authors give special thanks to Roxann Grover, MA, with UTMB Health, for developing the figures and tables for this work.

The authors certify that no party having a direct interest in the results of the research supporting this article has or will confer a benefit on them or on any organization with which they are associated.

The authors also certify that all financial and material supports for this research and work are clearly identified in the title page of this article.

Supplemental digital content is available for this article. Direct URL citation appears in the printed text and is provided in the HTML and PDF versions of this article on the journal's website (www.headtraumarehab.com).

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

The authors declare no conflicts of interests.

Corresponding Author: Angelle M. Sander, PhD, Brain Injury Research Center, TIRR Memorial Hermann, 1333 Moursund St, Houston, TX 77030 (asander@bcm.edu).

DOI: 10.1097/HTR.0000000000000863

life, self-efficacy, hope, reduction of disability, pain, relapse and rehospitalization rates, psychiatric symptoms, and occupational and social functioning. **Conclusions:** Findings are encouraging with regard to the effectiveness of self-management interventions in patients with symptoms similar to those of TBI. However, reviews did not address adaptation of self-management interventions for those with cognitive deficits or for populations with greater vulnerabilities, such as low education and older adults. Adaptations for TBI and its intersection with these special groups may be needed. **Key words:** *management, self, self-management, traumatic brain injury*

MODERATE TO SEVERE traumatic brain injury (TBI) can result in impaired physical,¹ sensory,² cognitive,³ emotional,⁴ and behavioral functioning⁵ that is often chronic and associated with decreased functioning in daily life and decreased participation in life roles, including employment and social relationships.⁶ Functional decline can occur following a period of stability, as evidenced by a third of persons with good recovery at 1 year after injury classified as disabled at 10 to 14 years.^{6,7} Because of these dynamic lifelong challenges that require ongoing monitoring and attention, TBI has been acknowledged as a chronic health condition,^{8,9} necessitating self-management across the life span.

The medical model for chronic disease management has historically focused on treatment of a specific condition,¹⁰ but many people with TBI have multiple chronic conditions or life circumstances to self-manage. One study based on a large multicenter TBI database showed that a substantial number of individuals with TBI had other chronic conditions at 10 years postinjury, including back pain, hypertension, depression, anxiety, orthopedic fractures, high cholesterol, sleep disorders, panic attacks, osteoarthritis, and diabetes.¹¹ Providing education to people about their specific conditions, including TBI, may not be adequate to reduce chronic disease burden.¹² While education is an important component, management of chronic disease requires the use of disease management skills, demonstration of actual management behaviors, and a strong patient-provider partnership.¹⁰ Broadly, self-management is considered an individual's ability to manage symptoms, treatment, physical and psychosocial consequences, and lifestyle changes related to living with a chronic condition.¹³ Self-management training has been widely utilized as an approach to disease management for many chronic conditions, such as pain, hypertension, obesity, and arthritis.^{14,15} Self-management requires an individual's active participation in disease management¹³ and use of specific skills, including problem-solving, decision-making, resource utilization, forming of a healthcare partnership, and taking action.¹³

Unfortunately, the skills necessary to actively engage in self-management can be particularly challenging after acquiring a disability such as TBI.¹⁶ For many people with moderate to severe TBI, the ability to set and

achieve goals is compromised by impaired cognitive and behavioral functions, including planning, self-monitoring, translating intention into action, and behavioral control.^{3,17} Poor self-awareness is often observed in individuals who have sustained moderate to severe TBI and is a poor prognosticator of productive goal-setting.¹⁸ Impaired working memory can disrupt the ability to keep information available for use in planning activities and modifying plans based on new information.¹⁹ Hence, the neurobehavioral deficits common after TBI pose particular challenges to be addressed in self-management programs targeting this population.²⁰

IMPORTANCE OF A CHRONIC CARE MODEL INCLUDING SELF-MANAGEMENT

Despite obstacles, it is important to empower individuals with TBI to be as independent as possible in managing their long-term health and to determine the types of supports that they require to do so. TBI rehabilitation programs typically focus on traditional cognitive, physical, and mental health concerns. Nonetheless, in a survey of participants with TBI 1 to 5 years postinjury, Dreer and colleagues²¹ found that everyday wellness goals, including physical activity, nutrition, and stress management, were highly endorsed by participants as concepts they would like to see addressed in an intervention program. Health-related goals such as these are consistent with the Chronic Care Model (CCM) that identifies self-management as one of the essential elements of a healthcare system that encourages high-quality chronic disease management.²² Given that TBI has been identified as a chronic condition,^{8,9} individuals with TBI may benefit from a CCM, including self-management, for management of health conditions and optimization of overall health and wellness.

BACKGROUND TO CURRENT REVIEW

The current review was conducted as one of the activities on a grant funded by the National Institute on Disability, Independent Living, and Rehabilitation Research to develop a CCM for individuals with TBI. Because of its crucial role in CCMs, self-management will be an important component of the model for individuals with TBI. The investigators planned to conduct a systematic review of studies investigating the

effectiveness of self-management interventions for persons with TBI. We were interested in delivering training in self-management to individuals with TBI and their caregivers in a manner that enables them to apply it to different health needs and conditions across their life span, similar to the comprehensive self-management programs that have been described for other chronic conditions.^{13–15} Our initial task was to adopt a working definition of self-management intervention. We adapted the definition proposed by Jonkman and colleagues,²³ which specifies that comprehensive self-management interventions “aim to equip patients with the skills to actively participate and take responsibility in the management of their chronic condition” and includes education or knowledge transfer and at least 2 of the following: training in independent sign/symptom monitoring (eg, monitoring of mood); medication management; enhancing decision-making or problem-solving skills for medical treatment management (included training in resource utilization); and changing physical activity, diet, or smoking/substance use behavior or other health behaviors.

Initial informal literature searches revealed that there were few studies that tested such a program for individuals with TBI. While the term “self-management” was often used in an article’s title or abstract, further review of the article revealed that the “self-management” intervention was often focused on education and/or one component of self-management, rather than meeting our working definition. The investigator team concluded that there were not enough investigations to warrant a systematic review or to yield conclusions that could guide informed decision-making about developing self-management training for individuals with TBI. Given the numerous systematic reviews on effectiveness of self-management in other chronic health conditions, many of which have symptom overlap with TBI, the authors decided to conduct an umbrella review to synthesize the evidence of self-management in these other conditions in order to guide informed clinical decision-making about implementation of self-management training in persons with TBI.

METHOD

This umbrella review was conducted according to guidelines developed by the Joanna Briggs Institute, as described in an article by Aromataris et al.²⁴ As recommended in this article, the methods for the review were conducted to be consistent with the Preferred Reporting System for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Review inclusion criteria

Type of review

We included only systematic reviews and meta-analyses of randomized controlled trials (RCTs) and/or nonran-

domized studies of interventions (NRSIs). We excluded scoping reviews, narrative reviews, review protocols, and reviews of nonintervention or qualitative studies. We included reviews that combined reviews of RCTs and/or NRSIs with qualitative studies if they presented the results in a manner that allowed us to draw conclusions based on the RCTs and/or NRSIs alone.

Populations

Reviews were included if they focused on studies with an adult population (at least 18 years of age) and chronic conditions that were common in persons with TBI or had symptoms overlapping with those of TBI. Reviews were included if they reported on studies targeting patients, caregivers, or the patient-caregiver duo. Decisions about which chronic health conditions to include were made a priori by 4 of the authors, starting with a review of the Centers for Medicare & Medicaid Services (CMS) list of chronic conditions. Each of the conditions was discussed, and a group consensus was achieved regarding whether to include it in the review. Decisions were based on the condition’s potential symptom overlap with TBI so that conclusions might be extrapolated to TBI. The following conditions were selected for inclusion due to likely symptom overlap: Alzheimer disease and related dementias; autism; depression; drug abuse/substance abuse; HIV/AIDS; schizophrenia and other psychotic disorders; and stroke. In addition to the conditions selected from the CMS list, the following chronic conditions were selected for inclusion due to symptom overlap with TBI: chronic pain; anxiety; and posttraumatic stress disorder. TBI itself was also included as a chronic condition for the purpose of the search. If a specific review not only included one of our targeted conditions but also included others, we retained it if the results for our targeted conditions were described separately so that they could be interpreted apart from the conditions not on our inclusion list.

Intervention

We adapted the definition proposed by Jonkman and colleagues,²³ as described in the introduction section. We included stress management and social engagement under the category of “other health behaviors” so that interventions focused on changing these behaviors were included.

Comparators

We included reviews of RCTs that utilized a control group or wait-list control. We also included nonrandomized comparisons of different self-management

treatment groups or of self-management with another comparison intervention (eg, education alone).

Outcomes

Reviews were included if they focused on studies involving 1 or more of the following outcomes: health knowledge; health service utilization; mortality; global health outcomes; physical or mental health outcomes; quality of life or life satisfaction; activities and participation outcomes; self-efficacy for healthcare management; self-management behaviors; and/or caregiver burden (or any of the aforementioned outcomes for caregivers).

Setting

Reviews were included that focused on self-management interventions delivered in an outpatient or community setting. We excluded reviews that focused only on inpatient or residential settings. We retained reviews that included a mix of studies focusing on outpatient/community and inpatient/residential settings if they presented the results in a way that allowed us to make separate conclusions for the outpatient/community settings.

Review selection

A health sciences librarian conducted systematic searches in Ovid MEDLINE, EMBASE, Cochrane Reviews, CINAHL, and PsycINFO from January 1, 2010, through May 3, 2021. The start date for the search was chosen to cover systematic reviews conducted over the past 10 years, which would have covered literature published over approximately the last 20 years. The librarian used terms associated with self-management and a combination of original and preestablished filters to limit results to the 11 targeted chronic conditions, as well as systematic reviews, meta-analyses, umbrella reviews, humans, adults, and English language. The full search strategy can be found in Supplemental Digital Content Appendix 1 (available at: <http://links.lww.com/JHTR/A811>). Abstracts and full-text articles resulting from the search were uploaded into Covidence for review, with duplicates removed. Abstracts were screened by 2 independent reviewers, with disagreements resolved through discussion. Full-text review was conducted by 2 independent reviewers who achieved consensus.

Data extraction

Each included article was extracted by one team member working independently and then verified by a different team member, with discrepancies resolved through discussion. Data extraction templates were developed by 4 investigators and entered into

Covidence. Extracted data included title, authors, date of publication, country of origin, databases searched, dates covered by search, age range covered by studies, settings covered by studies, self-management components included, delivery mode of intervention, targets of intervention, and outcomes assessed. Reviewers were asked to describe any adaptations to the self-management intervention that were used to compensate for cognitive impairments, as well as any results regarding effectiveness for special populations such as underrepresented racial and ethnic groups and low literacy. Finally, reviewers were asked to describe the potential relevance of the findings to developing self-management interventions for persons with TBI.

Quality ratings

Quality ratings were conducted by 2 independent reviewers, using quality criteria adapted from the rating system Assessing the Methodological Quality of Systematic Reviews-2 (AMSTAR-2).²⁵ Rating criteria are shown in Supplemental Digital Content Appendix 2 (available at: <http://links.lww.com/JHTR/A811><http://links.lww.com/JHTR/A812>). Two reviewers independently rated each criterion, with discrepancies resolved through discussion. The first and second authors then used these ratings to classify the overall quality of each article, using criteria recommended by Shea et al,²⁵ into one of the following categories: high (no critical weakness and either no or 1 noncritical weakness); moderate (no critical weaknesses, but more than 1 noncritical weakness); low (1 critical weakness with or without noncritical weaknesses); or critically low (more than 1 critical weakness, with or without noncritical weaknesses). Critical weaknesses included protocol not registered prior to the start of the review, inadequate literature search, no justification for study exclusion, no assessment of risk of bias, inappropriate meta-analytic techniques, lack of consideration of risk of bias when interpreting results, and assessment of the presence of likely impact of publication bias. Each of the first 2 authors assigned these ratings independently, with discrepancies resolved through discussion after additional reading of the reviews on which discrepancies occurred.

RESULTS

The PRISMA flowchart for the study, including reasons for exclusion, is shown in Figure 1. The initial database search resulted in 6210 records. After removal of duplicate records and excluded abstracts, the initial screening led to 257 full-text articles that were assessed for eligibility criteria. Of these, 231 were excluded on 1 or more criteria, and the reasons for exclusion of each are shown in the Supplemental Digital Content Table (available at: <http://links.lww.com/JHTR/A664>). The

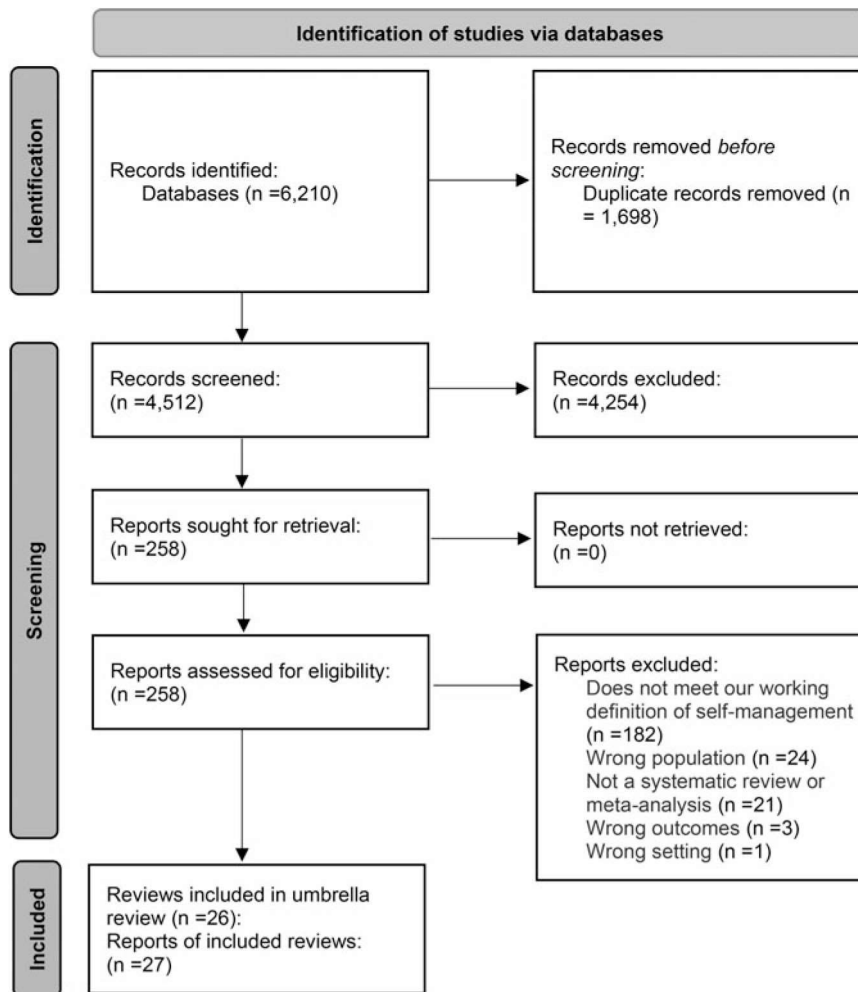


Figure 1. PRISMA flowchart. From Page et al.⁵⁸ For more information, visit: <http://www.prisma-statement.org/>.

primary reason for exclusion was that the interventions included in the review did not meet our working definition of self-management. Of the reviews that were excluded at the abstract screening stage, 144 were focused on TBI as a population. Five reviews focused on TBI were excluded during full-text review due to not meeting our working definition of self-management intervention. Twenty-six systematic reviews were included in the umbrella review. There was great variability defining self-management, with many reviews including education-only interventions or including 1 or 2 components of self-management only.

Quality of studies

Figure 2 shows the AMSTAR-2 quality ratings for each of the reviews included, as well as the overall quality rating category for each. Most reviews were judged to be of low or critically low quality because they had 1 or more critical weaknesses. The 2 most common critical

weaknesses included the lack of consideration for publication bias or risk of bias when interpreting the results. Five of the reviews were rated as high quality, and 2 were rated as moderate quality.

Summary of the reviews

The 26 reviews that were included covered 8 main chronic disease groups, including stroke ($n = 9$),^{26–34} chronic pain ($n = 8$),^{35–42} mental health (psychotic disorders [$n = 4$],^{43–46} general mental health [$n = 1$],⁴⁷ depression [$n = 1$],⁴⁸ posttraumatic stress disorder [$n = 1$]⁴⁹), HIV ($n = 1$),⁵⁰ and dementia ($n = 1$).⁵¹ Outcomes covered in the reviews included mental health, functional activities/disability, self-management of specific symptoms (eg, pain), self-efficacy for healthcare management, physical health, specific self-management behaviors (eg, medication adherence), quality of life, health knowledge, participation (occupational, social), health service utilization, global health, mortality, and caregiver outcomes.

	Canacott, 2019	Chapman, 2014	Clark, 2020	Dirnen-Griffen, 2019	Du, 2011	Goreis, 2020	Hooje, 2013	Kelly, 2014	Lennon, 2013	Martin, 2013	Park, 2013	Quinn, 2012	Sakakibara, 2016	Warner, 2017	Whitehead, 2015	Azeri, 2020	Du, 2020	Lin, 2020	Smith, 2013	Lean, 2019	Zou, 2013	Carnes, 2012	Elbers, 2018	Fryer, 2016	Lo, 2013	Parreira, 2017			
PICO components	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Protocol established	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Specified type of studies	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Comprehensive lit search	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Duplicate study section	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Duplicate data extraction	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
List of excluded studies with reasons	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Sufficient data extraction	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Tool for assessing risk of bias	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Source of funding reported for studies																	*										*		
Meta-analytic techniques appropriate	*	/	/	/	*	/	/	/	/	/	/	/	*	/	/	/	*	*	*	*	*	*	*	*	*	*	/	*	
Meta-analysis included risk of bias assessment	*	/	/	/	*	/	/	/	/	/	/	*	/	/	/	*	*	*	*	*	*	*	*	*	*	*	/	*	
Risk of bias incorporated into conclusions	*		*	*							*					*	*	*	*	*	*	*	*	*	*	*	*	*	
Heterogeneity of studies explained	*		*	*	*					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Publication bias assessed		*		*												*	*	*	*	*	*	*	*	*	*	*	*	*	
Potential sources of conflict reported	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
																										High Quality Rating			
																										Moderate Quality Rating			
																										Low Quality Rating			
																										Critically Low Quality Rating			
																										Not Applicable			

Figure 2. Quality ratings of included studies.

Table 1 shows the characteristics of the self-management interventions covered by the reviews with moderate- or high-quality ratings, including the components of self-management, delivery method of intervention, and target group. Most reviews included interventions

that addressed all 4 components of self-management, in addition to education. The majority of interventions included in reviews were conducted in person, but many included interventions conducted by telephone. Web-based and video delivery of self-management

TABLE 1 Characteristics of interventions for reviewed studies




	Carnes et al (2012) ⁴⁰	Elbers et al (2018) ⁴¹	Fryer et al (2016) ³³	Lean et al (2019) ⁴⁵	Lo et al (2013) ³⁴	Parreira et al (2017) ⁴²	Zou et al (2013) ⁴⁶
 Self-management components	Changing health behaviors	*	*	*	*	*	*
	Enhancing decision-making or skills for medical treatment management (includes resource facilitation)		*	*	*	*	*
	Training in independent sign/symptom monitoring			*	*	*	*
	Training in medication management			*	*	*	*
 Delivery Method	In person	*	*	*	*	*	*
	Telephone			*		*	
	Video	*				*	
	Web-based				*		
 Target of Intervention	Person with disease	*	*	*	*	*	*
	Group		*	*	*	*	*
	Caregiver/care partner			*	*	*	*
					*		
					*		

TABLE 2 Summary of conclusions of systematic reviews rated as moderate or high quality

Outcomes	Disease groups	
	Psychiatric disorders (schizophrenia, schizoaffective, bipolar)	Stroke
Health service utilization	<p>↓ avg. hospital length of stay posttreatment and follow-up (Lean et al, 2019⁴⁵)</p> <p>No effect on readmission posttreatment and follow-up (Lean et al, 2019⁴⁵)</p> <p>↓ mean number of readmissions (Lean et al, 2019⁴⁵)</p> <p>↓ rehospitalizations (Zou et al, 2013⁴⁶)</p>	
Global health		<p>↑ global health at short-term follow-up when delivered in the group setting and by a healthcare professional (Carnes et al, 2012⁴⁰); no effect at >8-mo follow-up (Carnes et al, 2012⁴⁰)</p> <p>↑ physical function when delivered in the group setting and by a healthcare professional (Carnes et al, 2012⁴⁰)</p> <p>No effect on physical function posttreatment and follow-up (Elbers et al, 2018⁴¹)</p>
Physical health		
Mental health	<p>No effect on hope and empowerment posttreatment (Lean et al, 2019⁴⁵)</p> <p>↑ hope and empowerment at follow-up (Lean et al, 2019⁴⁵)</p> <p>↓ relapse (Zou et al, 2013⁴⁶)</p> <p>↓ symptom severity, including positive, negative, and general symptoms (Zou et al, 2013⁴⁶)</p>	<p>No effect on depression posttreatment (Carnes et al, 2012⁴⁰)</p> <p>No effect on depression or anxiety levels (Fryer et al, 2016³³)</p> <p>No effect on depressive symptoms (Fryer et al, 2016³³)</p>
Self-management of specific symptoms	<p>↓ total psychiatric symptoms posttreatment and follow-up (Lean et al, 2019⁴⁵)</p> <p>No effect on positive symptoms posttreatment (Lean et al, 2019⁴⁵)</p> <p>↓ positive symptoms at follow-up (Lean et al, 2019⁴⁵)</p> <p>↓ negative symptoms posttreatment and follow-up (Lean et al, 2019⁴⁵);</p> <p>↓ depression and/or anxiety symptoms at posttreatment and follow-up (Lean et al, 2019⁴⁵)</p>	<p>↓ pain intensity at follow-up; at <4 mo, effect only seen when delivered in the group setting and by a healthcare professional (Carnes et al, 2012⁴⁰)</p> <p>No effect for reducing back pain intensity (Elbers et al, 2018⁴¹)</p> <p>↓ reducing lower back pain at follow-up (Parreira et al, 2017⁴²)</p>

(continues)

TABLE 2 Summary of conclusions of systematic reviews rated as moderate or high quality (Continued)

		Disease groups	
Outcomes	Psychiatric disorders (schizophrenia, schizoaffective, bipolar)	Chronic pain	Stroke
QOL/Life satisfaction	↑ quality of life posttreatment and follow-up (Lean et al, 2019 ⁴⁵)		↑ stroke-specific quality of life (Fryer et al, 2016 ³³)
Activities	↓ functional disability posttreatment and follow-up (Lean et al, 2019 ⁴⁵)	↑ physical activity posttreatment, but not a clinically important change (Elbers et al, 2018 ⁴¹) ↓ pain disability, but not a clinically important change (Elbers et al, 2018 ⁴¹) No effect on physical activity at follow-up (Elbers et al, 2018 ⁴¹)	No effect on activity limitation (Fryer et al, 2016 ³³)
Participation	↑ social functioning posttreatment and follow-up (Lean et al, 2019 ⁴⁵) ↑ occupational function (Zou et al, 2013 ⁴⁶) ↑ social contacts (Zou et al, 2013 ⁴⁶) ↑ self-efficacy posttreatment and follow-up (Lean et al, 2019 ⁴⁵)		
Self-efficacy for healthcare management		↑ self-efficacy at follow-up, when delivered in the group setting and by a healthcare professional (Carnes et al, 2012 ⁴⁰) ↑ self-efficacy at follow-up, but not a clinically important change (Elbers et al, 2018 ⁴¹)	↑ self-efficacy (Fryer et al, 2016 ³³) No effect on locus of control (Fryer et al, 2016 ³³) ↑ self-efficacy in communicating with physicians at follow-up (Lo et al, 2013 ³⁴)
Specific self-management behaviors	↑ medication adherence (Zou et al, 2013 ⁴⁶)		No effect on cognitive self-management practices at follow-up (Lo et al, 2013 ³⁴) No effect on participation in aerobic exercise at follow-up (Lo et al, 2013 ³⁴)

Abbreviation: QOL, quality of life.
^a↑ = improved/increased; ↓ = reduced/decreased.

interventions was relatively rare. Interventions were most often targeted toward the individual or groups of individuals, with few studies targeting caregivers or the patient-caregiver duo.

Synthesis of findings from high- and moderate-quality studies

Table 2 shows the conclusions of the 7 reviews that were rated as high or moderate in quality. Three focused on effectiveness of self-management interventions for chronic pain, 2 addressed stroke, and 2 focused on mental health disorders. The 2 that focused on stroke showed positive outcomes on quality of life, general self-efficacy,³³ and self-efficacy for communicating with physicians.³⁴ No effect of self-management interventions was found for reducing depression or anxiety or physical disability.³³ Self-management was not effective for increasing use of self-management strategies of cognitive or mental relaxation or for increasing aerobic exercise.³⁴

Self-management was found to impact a variety of outcomes in 3 reviews focused on patients with chronic pain. For patients with chronic musculoskeletal pain, self-management interventions were found to be effective for improving self-efficacy,^{40,41} reducing pain disability,⁴⁰ and reducing perceived pain intensity.^{40,41} One review⁴⁰ concluded that self-management interventions were effective for improving physical function, while a second review concluded a lack of benefits for physical function.⁴¹ Carnes and colleagues⁴⁰ concluded positive effects on pain intensity, global health, physical health, and self-efficacy, when the intervention was delivered by a healthcare professional in a group setting. In patients with chronic back pain, Parreira and colleagues⁴² concluded that there is low-quality evidence that Back Schools, which include self-management interventions, are effective for reducing pain and pain-related disability.

The reviews of self-management intervention for patients with mental health disorders with psychotic features (including schizophrenia, schizoaffective disorder, and bipolar disorder) concluded that self-management interventions led to a reduction in overall psychiatric symptoms, including positive, negative, and general symptoms.^{45,46} Self-management intervention was also associated with a decreased number of readmissions/rehospitalizations, as well as reduced relapse rates. Intervention was associated with increased hope and feelings of empowerment, increased quality of life, increased self-efficacy for managing health, reduced functional disability, improved occupational and social functioning, and improved medication adherence.

Our umbrella review did not identify any systematic reviews regarding self-management interventions for persons with TBI.

DISCUSSION

Our umbrella review did not yield evidence for the effectiveness of self-management interventions for persons with TBI, based on our working definition. The literature in this area is early in its development, and evaluation of comprehensive self-management programs to improve outcomes following TBI is needed. While we did not find systematic reviews of self-management studies for persons with TBI, a single study showed effectiveness of anger self-management training (psychoeducation, training in self-monitoring of anger and problem-solving) for reducing self-reported trait anger in persons with TBI.⁵²

Our umbrella review did yield encouraging findings regarding the effectiveness of self-management interventions in chronic conditions whose symptoms overlap with TBI. Chronic pain is common in the TBI population⁵³ and therefore self-management of pain symptoms is a priority. The findings that self-management interventions are effective for reducing pain intensity and pain-related disability, and for improving physical function in people with chronic pain, suggest that these interventions may be effective for management of chronic pain in individuals with TBI. However, these interventions may have to be adapted to be effectively implemented by people with TBI who typically have cognitive impairment. The positive impact of self-management interventions for a variety of outcomes in patients with mental health disorders with psychotic features is relevant to persons with TBI, as individuals with psychotic disorder have been shown to have impairments in verbal memory, processing speed, working memory, and social cognition.^{54,55}

Evidence on the effectiveness of self-management intervention for people with stroke is relevant for people with TBI, as these populations overlap with regard to cognitive, emotional, and behavioral symptoms. Conclusions of reviews of self-management in patients with stroke are encouraging with regard to effects on quality of life and self-efficacy. Unfortunately, the reviews concluded that self-management interventions with community-dwelling persons following stroke have not led to improvement in symptoms of depression or anxiety, use of self-management strategies for relaxation, participation in aerobic exercise, reduction in physical disability, or reduction in medical risk factors for stroke. Any self-management intervention that is likely to be effective for people with TBI must include consideration of the impact of cognitive, emotional, and behavioral impairments on ability to understand and implement self-management strategies, and the intervention should include adaptations that can be made to tailor the intervention for people with such impairments. Unfortunately, the reviews of self-management in patients with stroke offer a minimal understanding of cognitive obstacles to learning and implementing

self-management. Level of cognitive impairment and its potential impact on benefit were not discussed in these reviews. Indeed, some of the studies that were reviewed specifically excluded individuals with cognitive impairments. Lo and colleagues³⁴ indicated that the studies that they reviewed were unclear as to how learning of skills, such as problem-solving and decision-making, was facilitated for individuals with stroke.

In conducting our review, we were interested in whether there was evidence of the effectiveness of self-management interventions for subgroups of individuals that are overrepresented among people with TBI, including older patients and underserved racial/ethnic groups. We found minimal investigation of the differential impact of self-management interventions for these subgroups. These different subgroups may require tailoring of self-management interventions in the context of their socioeconomic and cultural environments. Another challenge is determining what key characteristics of the intervention (eg, content, delivery method, frequency of contact, technology use) are drivers of successful outcomes. Only one review examined the effects of different delivery methods, interventionists, intervention duration, and intervention components. Carnes and colleagues⁴⁰ emphasized the difficulty with examining the effects of complex and multicomponent self-management interventions.

The role of caregivers in facilitating learning and implementation of self-management in people with stroke has not been addressed in the systematic reviews, and this would have relevance for people with TBIs. The review by Lo and colleagues³⁴ included studies that allowed caregivers to participate in sessions with patients with stroke, but no conclusions were drawn about the specific role of caregivers in assisting the person with stroke to learn and implement self-management. While independence of the person with stroke or TBI is the ultimate goal, some individuals will likely need the assistance of a caregiver, depending on the level of impairment. Thus, education of caregivers on how to assist the person with injury to learn and implement self-management is necessary.

Our review did not yield consistent evidence of the role of peer mentorship in self-management interventions. One review in the area of chronic pain indicated that self-management interventions were effective when led

by healthcare professionals or lay persons, but the lay persons were not peers with the same disability as the target group.⁴⁰ Lo and colleagues³⁴ recognized that stroke survivors and their caregivers valued peer-led programs and perceived benefits through sharing of advice and social connectedness. Peer mentoring has long been perceived as valuable by individuals with TBI,⁵⁶ although there is insufficient evidence of its effectiveness for improving self-management outcomes.⁵⁷ Based on perceived value to people with TBI, consideration should be given to integrating peer mentors into professional-led self-management training.

LIMITATIONS

The current umbrella review was conducted to extract lessons that could be applied to development of self-management interventions for individuals with TBI, and a decision was made to include reviews that focused on self-management for chronic health conditions in which symptoms overlapped with TBI. Conclusions were made on the basis of 7 reviews that covered only 3 chronic health conditions. Our quality ratings of the reviews related to the methodology of the systematic review itself, and a low rating did not necessarily correspond to low quality of studies included in the review. This is a limitation of umbrella reviews and may result in missing information from specific studies that may indicate high-quality evidence. Our working definition of self-management intervention may have resulted in exclusion of some reviews that could have yielded information that could be applied to individuals with TBI.

CONCLUSION

Lessons learned from reviews of the effectiveness of self-management interventions for individuals with chronic health conditions for which symptoms overlap with TBI suggest that such interventions may be effective for improving many outcomes; however, the results for individuals with cognitive impairment and other special needs are uncertain. Development of self-management interventions for persons with TBI should focus on tailoring existing intervention programs to build in compensatory strategies and supports for facilitating learning of implementation of self-management skills. Studies evaluating such interventions for persons with TBI are needed.

REFERENCES

1. Bell KR, Halsey SL. Complications associated with immobility after acquired brain injury. In: Zasler ND, Katz DI, Zafonte RD, Arciniegas DB, Bullock MR, Hammond FM, Kreutzer JS, Nakase-Richardson R, Watanabe TK, eds. *Brain Injury Medicine: Principles and Practice*. Springer Publishing Company; 2022: 744–751.
2. Callahan ML, Lim MM. Sensory sensitivity in TBI: Implications for chronic disability. *Curr Neurol Neurosci Rep*. 2018;18(9):56. doi:10.1007/s11910-018-0867-x
3. Rabinowitz AR, Levin HS. Cognitive sequelae of traumatic brain injury. *Psychiatr Clin North Am*. 2014;37(1):1–11. doi:10.1016/j.psc.2013.11.004

4. Osborn AJ, Mathias JL, Fairweather-Schmidt AK, Anstey KJ. Anxiety and comorbid depression following traumatic brain injury in a community-based sample of young, middle-aged and older adults. *J Affect Disord.* 2017;213:214–221. doi:10.1016/j.jad.2016.09.045
5. Arciniegas DB, Wortzel HS. Emotional and behavioral dyscontrol after traumatic brain injury. *Psychiatr Clin North Am.* 2014;37(1):31–53. doi:10.1016/j.psc.2013.12.001
6. Corrigan JD, Cuthbert JP, Harrison-Felix C, et al. US population estimates of health and social outcomes 5 years after rehabilitation for traumatic brain injury. *J Head Trauma Rehabil.* 2014;29(6):E1–E9. doi:10.1097/HTR.00000000000000020
7. McMillan TM, Teasdale GM, Stewart E. Disability in young people and adults after head injury: 12–14 year follow-up of a prospective cohort. *J Neurol Neurosurg Psychiatry* 2012;83(11):1086–1091. doi:10.1136/jnnp-2012-302746
8. Masel BE, DeWitt DS. Traumatic brain injury: a disease process, not an event. *J Neurotrauma.* 2010;27(8):1529–1540. doi:10.1089/neu.2010.1358
9. Corrigan JD, Hammond FM. Traumatic brain injury as a chronic health condition. *Arch Phys Med Rehabil.* 2013;94(6):1199–1201. doi:10.1016/j.apmr.2013.01.023
10. Allegrante JP, Wells MT, Peterson JC. Interventions to support behavioral self-management of chronic diseases. *Annu Rev Public Health.* 2019;40:127–146. doi:10.1146/annurev-pubhealth-040218-044008
11. Hammond FM, Corrigan JD, Ketchum JM, et al. Prevalence of medical and psychiatric comorbidities following traumatic brain injury. *J Head Trauma Rehabil.* 2019;34(4):E1–E10. doi:10.1097/HTR.0000000000000465
12. Hart T, Driver S, Sander A, et al. Traumatic brain injury education for adult patients and families: a scoping review. *Brain Inj.* 2018;32(11):1295–1306. doi:10.1080/02699052.2018.1493226
13. Lorig KR, Holman HR. Self-management education: history, definition, outcomes, and mechanisms. *Ann Behav Med.* 2003;26(1):1–7. doi:10.1207/S15324796ABM2601_01
14. Barlow J, Wright C, Sheasby J, Turner A, Hainsworth J. Self-management approaches for people with chronic conditions: a review. *Patient Educ Couns.* 2002;48(2):177–187. doi:10.1016/s0738-3991(02)00032-0
15. Barlow JH, Bancroft GV, Turner AP. Self-management training for people with chronic disease: a shared learning experience. *J Health Psychol.* 2005;10(6):863–872. doi:10.1177/1359105305057320
16. Siegert RJ, Taylor WJ. Theoretical aspects of goal-setting and motivation in rehabilitation. *Disabil Rehabil.* 2004;26(1):1–8. doi:10.1080/09638280410001644932
17. Paus T. Primate anterior cingulate cortex: where motor control, drive and cognition interface. *Nat Rev Neurosci.* 2001;2(6):417–424. doi:10.1038/35077500
18. Fischer S, Gauggel S, Trexler LE. Awareness of activity limitations, goal setting and rehabilitation outcome in patients with brain injuries. *Brain Inj.* 2004;18(6):547–562. doi:10.1080/02699050310001645793
19. Fuster JM. *Cortex and Mind: Unifying Cognition.* Oxford University Press; 2003:155–163.
20. Hart T, Evans J. Self-regulation and goal theories in brain injury rehabilitation. *J Head Trauma Rehabil.* 2006;21(2):142–155. doi:10.1097/00001199-200603000-00007
21. Dreer L, Bailey B, Cox M, et al. Examination of health areas for change among community dwelling survivors of a moderate-severe traumatic brain injury: a need for patient-centered, comprehensive health and wellness initiatives. *Arch Phys Med Rehabil.* 2022;103(3):e37. doi:10.1016/j.apmr.2022.01.103
22. Bodenheimer T, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness. *JAMA.* 2002;288(14):1775–1779. doi:10.1001/jama.288.14.1775
23. Jonkman NH, Schuurmans MJ, Jaarsma T, Shortridge-Baggett LM, Hoes AW, Trappenburg JCA. Self-management interventions: proposal and validation of a new operational definition. *J Clin Epidemiol.* 2016;80:34–42. doi:10.1016/j.jclinepi.2016.08.001
24. Aromataris E, Fernandez R, Godfrey CM, Holly C, Khalil H, Tungpunkom P. Summarizing systematic reviews: methodological development, conduct and reporting of an umbrella review approach. *Int J Evid Based Healthc.* 2015;13(3):132–140. doi:10.1097/XEB.0000000000000055
25. Shea BJ, Reeves BC, Wells G, et al. AMSTAR-2: a critical appraisal tool for systematic reviews that include randomized or non-randomized studies of healthcare interventions, or both. *BMJ.* 2017;358:j4008. doi:10.1136/bmj.j4008
26. Canacott L, Moghaddam N, Tickle A. Is the Wellness Recovery Action Plan (WRAP) efficacious for improving personal and clinical recovery outcomes? A systematic review and meta-analysis. *Psychiatr Rehabil J.* 2019;42(4):372–381. doi:10.1037/prj0000368
27. Chapman B, Bogle V. Adherence to medication and self-management in stroke patients. *Br J Nurs.* 2014;23(3):158–166. doi:10.12968/bjon.2014.23.3.158
28. Clark E, MacCrosain A, Ward NS, Jones F. The key features and role of peer support within group self-management interventions for stroke? A systematic review. *Disabil Rehabil.* 2020;42(3):307–316. doi:10.1080/09638288.2018.1498544
29. Lennon S, McKenna S, Jones F. Self-management programmes for people post stroke: a systematic review. *Clin Rehabil.* 2013;27(10):867–878. doi:10.1177/0269215513481045
30. Sakakibara BM, Kim AJ, Eng JJ. A systematic review and meta-analysis on self-management for improving risk factor control in stroke patients. *Int J Behav Med.* 2017;24(1):42–53. doi:10.1007/s12529-016-9582-7
31. Warner G, Packer T, Villeneuve M, Auduly A, Versnel J. A systematic review of the effectiveness of stroke self-management programs for improving function and participation outcomes: self-management programs for stroke survivors. *Disabil Rehabil.* 2015;37(23):2141–2163. doi:10.3109/09638288.2014.996674
32. Lin S, Xiao LD, Chamberlain D, Newman P, Xie S, Tan JY. The effect of transition care interventions incorporating health coaching strategies for stroke survivors: a systematic review and meta-analysis. *Patient Educ Couns.* 2020;103(10):2039–2060. doi:10.1016/j.pec.2020.05.006
33. Fryer CE, Luker JA, McDonnell MN, Hiller SL. Self-management programs for quality of life in people with stroke. *Cochrane Database Syst Rev.* 2016;2016(8):CD010442. doi:10.1002/14651858.CD010442.pub2
34. Lo SHS, Chnag AM, Chau JPC, Gardner GE. Theory-based self-management programs for promoting recovery in community-dwelling stroke survivors: a systematic review. *JBI Database Syst Rev Implement Rep.* 2013;11(12):157–215. doi:10.11124/jbisrir-2013-1056
35. Du S, Yuan C, Xiao X, Chu J, Qiu Y, Qian H. Self-management programs for chronic musculoskeletal pain conditions: a systematic review and meta-analysis. *Patient Educ Couns.* 2011;85(3):e299–e310. doi:10.1016/j.pec.2011.02.021
36. Martin D, Schofield P, Jones D, et al. The effect of Stanford-type self-management programmes on pain and function in older people with persistent pain: a systematic review of randomised controlled trials. *J Pain Manag.* 2013;6:117–122.
37. Park J, Hughes AK. Nonpharmacological approaches to the management of chronic pain in community-dwelling older adults: a review of empirical evidence. *J Am Geriatr Soc.* 2012;60(3):555–568. doi:10.1111/j.1532-5415.2011.03846.x

38. Du S, Liu W, Cai S, Hu Y, Dong J. The efficacy of e-health in the self-management of chronic low back pain: a meta-analysis. *Int J Nurs Stud.* 2020;106:103507. doi:10.1016/j.ijnurstu.2019.103507
39. Smith TO, Davies L, McConnell L, Cross J, Hing CB. Self-management programs for people with osteoarthritis: a systematic review and meta-analysis. *Curr Rheumatol Rev.* 2013;9(3):165–175. doi:10.2174/157339710903140130121859
40. Carnes D, Homer KE, Miles CL, et al. Effective delivery styles and content for self-management interventions for chronic musculoskeletal pain: a systematic literature review. *Clin J Pain.* 2012; 28(4):344–354. doi:10.1097/AJP.0b013e31822ed2f3
41. Elbers S, Wittink H, Pool JJM, Smeets RJEM. The effectiveness of generic self-management interventions for patients with chronic musculoskeletal pain on physical function, self-efficacy, pain intensity and physical activity: a systematic review and meta-analysis. *Eur J Pain.* 2018;22(9):1577–1596. doi:10.1002/ejp.1253
42. Parreira P, Heymans MW, van Tulder MW, et al. Back schools for chronic non-specific low back pain. *Cochrane Database Syst Rev.* 2017;8(8):CD011674. doi:10.1002/14651858.CD011674.pub2
43. Kelly EL, Fenwick KM, Barr N, Cohen H, Brekke JS. A systematic review of self-management health care models for individuals with serious mental illnesses. *Psychiatr Serv.* 2014;65(11):1300–1310. doi:10.1176/appi.ps.201300502
44. Whiteman KL, Naslund JA, DiNapoli EA, Bruce ML, Bartels SJ. Systematic review of integrated general medical and psychiatric self-management interventions for adults with serious mental illness. *Psychiatr Serv.* 2016;67(11):1213–1225. doi:10.1176/appi.ps.201500521
45. Lean M, Fornells-Ambrojo M, Milton A, et al. Self-management interventions for people with severe mental illness: systematic review and meta-analysis. *Br J Psychiatry.* 2019;214(5):260–268. doi:10.1192/bjp.2019.54
46. Zou H, Li Z, Nolan MT, Arthur D, Wang H, Hu L. Self-management education interventions for persons with schizophrenia: a meta-analysis. *Int J Ment Health Nurs.* 2013;22(3):256–271. doi:10.1111/j.1447-0349.2012.00863.x
47. Dineen-Griffin S, Garcia-Cardenas V, Williams K, Benrimoj SI. Helping patients help themselves: a systematic review of self-management support strategies in primary health care practice. *PLoS One.* 2019;14(8):e0220116. doi:10.1371/journal.pone.0220116
48. Houle J, Gascon-Depatie M, Bélanger-Dumontier G, Cardinal C. Depression self-management support: a systematic review. *Patient Educ Couns.* 2013;91(3):271–279. doi:10.1016/j.pec.2013.01.012
49. Goreis A, Felhofer A, Kafka JX, Probst T, Kothgassner OD. Efficacy of self-management smartphone-based apps for post-traumatic stress disorder symptoms: a systematic review and meta-analysis. *Front Neurosci.* 2020;14:3. doi:10.3389/fnins.2020.00003
50. Aleri HA, Marshall A, Harvey G. Interventions to improve self-management of adults living with HIV on antiretroviral therapy: a systematic review. *PLoS One.* 2020;15(5):e0232709. doi:10.1371/journal.pone.0232709
51. Quinn C, Toms G, Anderson D, Clare L. A review of self-management interventions for people with dementia and mild cognitive impairment. *J Appl Gerontol.* 2016;35(11):1154–1188. doi:10.1177/0733464814566852
52. Hart T, Brockway JA, Maiuro RD, et al. Anger self-management training for chronic moderate to severe traumatic brain injury: results of a randomized controlled trial. *J Head Trauma Rehabil.* 2017;32(5):319–331. doi:10.1097/HTR.0000000000000316
53. Irvine KA, Clark JD. Chronic pain after traumatic brain injury: pathophysiology and pain mechanisms. *Pain Med.* 2018; 19(7): 1315–1333. doi:10.1093/pm/pnx153
54. Anselmetti S, Bechi M, Bosia M, et al. “Theory” of mind impairment in patients affected by schizophrenia and in their parents. *Schizophr Res.* 2009;115(2/3):278–285. doi:10.1016/j.schres.2009.09.018
55. Gebreegziabhere Y, Habatmu K, Mihretu A, Cella M, Alem A. Cognitive impairment in people with schizophrenia: an umbrella review. *Eur Arch Psychiatry Clin Neurosci.* 2022;272(7):1139–1155. doi:10.1007/s00406-022-01416-6.
56. Hibbard M, Cantor J, Charatz H, et al. Peer support in the community: initial findings of a mentoring program for individuals with traumatic brain injury and their families. *J Head Trauma Rehabil.* 2002;17(2):112–131. doi:10.1097/00001199-200204000-00004
57. Morris RP, Fletcher-Smith JC, Radford KA. A systematic review of peer mentoring interventions for people with traumatic brain injury. *Clin Rehabil.* 2017;31(8):1030–1038. doi:10.1177/0269215516676303
58. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ.* 2021;372:n71. doi:10.1136/bmj.n71