

A Scoping Review of Systemic Assessment for Clients Presenting in Adults with Traumatic Brain Injuries: Integrating Biopsychosocial and Family Systems Perspectives

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ABSTRACT

The complexity of traumatic brain injury (TBI) requires coordination across professional disciplines and across stages of recovery. Further, the multidimensional consequences of TBI demand an appraisal method that extends beyond neurological and physical impairment. In spite of the recognition that TBI affects interconnected biological, psychological, social, functional and family domains, it remains unclear how these domains are brought together during assessment. This scoping review maps and synthesises the existing evidence on assessment across biological, cognitive, psychological, social, functional, family, caregiver and relational domains; establishes the extent of family and inter-disciplinary involvement; and determines integration gaps. The review was conducted within the context of adult TBI care and rehabilitation. A total of 26 publications were included in the study. The inclusion criteria was articles based on primary research and published between January 2000 to September 2026 involving adults with TBI. The studies selected were published in English language. The search strategy involved a systematic, comprehensive search of PubMed/MEDLINE, Europe PubMed Central, and Director of Open Access Journals (DOAJ). Thematic analysis was then utilized to identify common categories and patterns across the extracted information, undertaking narrative content analysis to categorize the information. The results reveal a strong convergence toward viewing TBI as a condition with consequences extending beyond the injured individual to the family and wider social environment. A second point of convergence relates to the nexus between functional, social, psychological, and family outcomes. However, few studies provided evidence relevant to integrated or systemic assessment, particularly by demonstrating relationships among patient functioning, caregiver/family psychosocial characteristics, family functioning, community participation, and rehabilitation outcomes. The most salient gap identified in the present review is the fragmentation of assessment across individual, family, and social domains. The key integration gap for future research is the absence of a fully integrated biopsychosocial-family systems model. A conceptual integration of systemic TBI assessment is proposed.

Keywords: Integration, Family Systems, Traumatic Brain Injury, Scoping Review

INTRODUCTION

Traumatic brain injury (TBI) is a public health issue ensuing from an abrupt external force that interrupts normal functioning of the brain and may be due either to piercing or non-piercing injury (Ginsburg & Smith, 2025). Typical causes include falls, blasts, motor vehicle accidents, blunt-force trauma, and sports injuries, with consequences ranging from loss of consciousness and memory deficits to cognitive deterioration and mental health disturbances (Mortezaei et al., 2025). Trauma brain injury is commonly classified as mild, moderate, or severe according to the duration of loss of consciousness and related clinical indicators (Marino et al., 2025). Although TBI emanates as a neurological injury, its impact may persist beyond the acute event, yielding long-term physical, cognitive and emotional impairments that call for thorough and multidisciplinary management (Pacheco et al., 2025). The condition therefore represents more than an isolated disruption of brain functioning because its effects may extend into everyday functioning, relationships, and the broader social environment (Mortezaei et al., 2025).

The multidimensional consequences of TBI demand an appraisal method that extends beyond neurological and physical impairment. The biopsychosocial model provides such a framework by recognising the interaction of medical (Matney et al., 2022). Walsh (2021) underscores the importance of understanding family dynamics when addressing resilience and relational balance. Thus, biopsychosocial assessment offers a foundation for understanding TBI as a multidimensional condition in which biological, psychological and social factors interact rather than operate independently. The systemic implications of TBI make family assessment an important dimension of comprehensive evaluation. Subsequent to injury, changes in cognitive, behavioural and personality functioning may alter established family roles, relationships and caregiving responsibilities, impacting both the injured person and other members of the family system. Traumatic brain injury may thus contribute to relational conflict, increase caregiver burden and emotional distress among family members, while simultaneously affecting quality of life and everyday family functioning (Whiffin et al., 2021). Family systems assessment provides an opportunity to examine interactional processes, family roles, problem-solving and collaborative responses to the consequences of injury. Such assessment is important because family experiences may provide information about recovery and rehabilitation that cannot be obtained exclusively from the injured individual. A family-inclusive approach can therefore identify both weaknesses and strengths within the family system and contribute to interventions aimed at promoting resilience and wellbeing following TBI (Walsh, 2021).

The complexity of TBI further requires coordination across professional disciplines and across stages of recovery (Mortezaei et al., 2025). It may affect neurological, cognitive, emotional, behavioural and social functioning while at the same time disrupting family relationships (Shelley-Tremblay & Lawton, 2025). Thus, assessment and management need to recognise the interconnectedness of the individual, family, caregivers, healthcare professionals and community resources (Lindlöf et al., 2024). Inter-disciplinary collaboration brings together different areas of expertise across the acute, rehabilitation and psychosocial phases of care, including medical, nursing, physiotherapy, occupational therapy, neuropsychology, speech and language therapy, counselling, social work and family therapy (Macauley, 2024; Yan et al., 2024). Such collaboration can facilitate holistic assessment, continuity of care, shared treatment planning and attention to physical, psychological and social needs (Chan et al., 2022; Reeves et al., 2020). However, differences in professional priorities and language, hierarchical decision-making, time constraints, limited resources and inadequate coordination systems may fragment assessment and management, with different professionals potentially focusing on separate aspects of the individual's recovery (Mathew et al., 2024).

In spite of the recognition that TBI affects interconnected biological, psychological, social, functional and family domains, it remains unclear how these domains are brought together during assessment. Existing approaches (Matney et al., 2022; Walsh, 2021; Lindlöf et al., 2024) emphasise biopsychosocial assessment, family-system assessment and inter-professional collaboration, but the literature does not establish the extent to which these perspectives are integrated into a coherent systemic assessment of adults with TBI. Previous scoping reviews (Hayes et al. 2023; Page et al., 2021; Mamman et al., 2024; Muliira et al., 2024) mapped individual components of systemic assessment, but limited scoping reviews has brought them together to determine how systemically adult TBI assessment is actually conducted. What is still unknown is therefore not simply an absence of multidimensional assessment, but lack of clarity about the degree of systemic integration within modern TBI assessment.

The present scoping review maps and synthesises the existing evidence on assessment across biological, cognitive, psychological, social, functional, family, caregiver and relational domains; establishes the extent of family and inter-disciplinary involvement; and determines integration gaps.

METHODS

Scoping reviews are exploratory studies that systematically map the literature available on a topic with the aim of identifying key concepts, information sources, and gaps in the literature (Munn et al. 2018). These reviews primarily carried out to explore the breadth or depth of the literature, map and summarize the information, inform future research, and identify or address knowledge gaps (Tricco et al. 2018). It not only facilitates the identification of the coverage of research on a given field, it uncovers the current information (Peters et al. 2020). The framework proposed by Arksey and O'Malley (2005) was adopted for this purpose. According to Arksey

and O'Malley (2005), scoping reviews are used to investigate the scope, breadth, and characteristics of research undertakings within a particular field. The framework entailed identification of the research question, relevant articles, article selection, data charting, data collation, data summarization, and reporting of results. The framework was buttressed by the updated protocol Preferred Reporting Items for Systematic Reviews and meta - Analysis (PRISMA) (Peter et al. 2020). The PRISMA protocol is available at [www. Prisma-statement.org / Extensions/Scoping Reviews](http://www.Prisma-statement.org/Extensions/Scoping%20Reviews). The (PRISMA-ScR) checklist provided a clear sense-making of the related terminology, core concepts, and key items to report for scoping review (Tricco et al. 2018).

The review was conducted within the context of adult traumatic brain injury (TBI) care and rehabilitation, where TBI affects not only neurological and physical functioning but also cognitive, psychological, social, family, and everyday functioning. The context encompasses healthcare, rehabilitation, psychosocial, and community settings in which adults with TBI and their families interact with healthcare professionals and support systems. A total of 26 publications were included in the study. The inclusion criteria was articles based on primary research and published between January 2000 to September 2026 involving adults with TBI, The studies selected were published in English language. Studies were excluded if they focused exclusively on children, non-traumatic brain injuries, or other neurological conditions. Similarly, literature-review based studies and grey literature were excluded.

The search strategy involved a systematic, comprehensive search of PubMed/MEDLINE, Europe PubMed Central, and Director of Open Access Journals (DOAJ), supplemented by Google Scholar and backward and forward citation searching of relevant studies and reviews. Search terms combined concepts related to TBI including concussion head injury, biopsychosocial, cognitive, psychological, social, functional, family, caregiver, and relational concepts. Search was conducted between August and September 2026. The electronic Search Strategies Peer Review of Electronic Search Strategies (PRESS) for systematic reviews and other information syntheses were used to determine which elements of the electronic search were addressed (Peters et al. 2020). The PIO was used to carry out the electronic searches. According to Rosèn (2017), PIO is applied internationally and stands for Population intervention and Outcome. In this review, (P) represented the population of adult patients with TBI, (I) stood for trauma care which is the intervention and (O), represented the outcome.

Table 1 displays the search queries. As shown in the table, the search queries were structured around three complementary combinations: (1) TBI and assessment, combining terms such as “traumatic brain injury,” “TBI,” “concussion,” “head injury” with assessment, evaluation, screening, and measurement; (2) TBI, assessment and biopsychosocial domains, adding terms such as cognitive, psychological, emotional, behavioural, social, functional, quality of life, and participation; and (3) TBI, assessment and family/relational domains, adding family, family functioning, family systems, caregiver, caregiver burden, spouse, marital, partner, relational, and interpersonal. Boolean operators (AND/OR) and database-specific subject headings were used to combine these terms, with truncation applied where appropriate.

Table 1. Search Queries

Search query PubMed/MEDLINE, Europe PubMed Central, and DOAJ		
“Traumatic Brain Injury,” “TBI,” “Concussion,” “Head Injury” with Assessment, Evaluation, Screening, And Measurement	AND/ OR	“Cognitive,” “Psychological,” “Emotional,” “Behavioural, Social”, “Functional”, “Quality of Life”, and “Participation”; “TBI, Assessment” “Family”, “Family Functioning”, “Family Systems”, “Caregiver”, “Caregiver Burden”, “Spouse”, “Marital, Partner”, “Relational”, and “Interpersonal”

Article identification, screening, and selection followed a systematic, multi-stage process. The first stage entailed weeding out duplicates and non-english studies. Subsequently, the titles and abstracts were screened in light of the set inclusion and exclusion criteria, whereby potentially relevant articles were retained for full-text appraisal. The third stage entailed reviewing full text to verify eligibility based on the target population, variables of interest, research context, publication period, language, and evidence of primary research. Articles that fell short

of this criteria were dropped. The retained studies were subjected to the scoping review process and reported using a PRISMA-ScR flow chart as depicted in Figure 1.

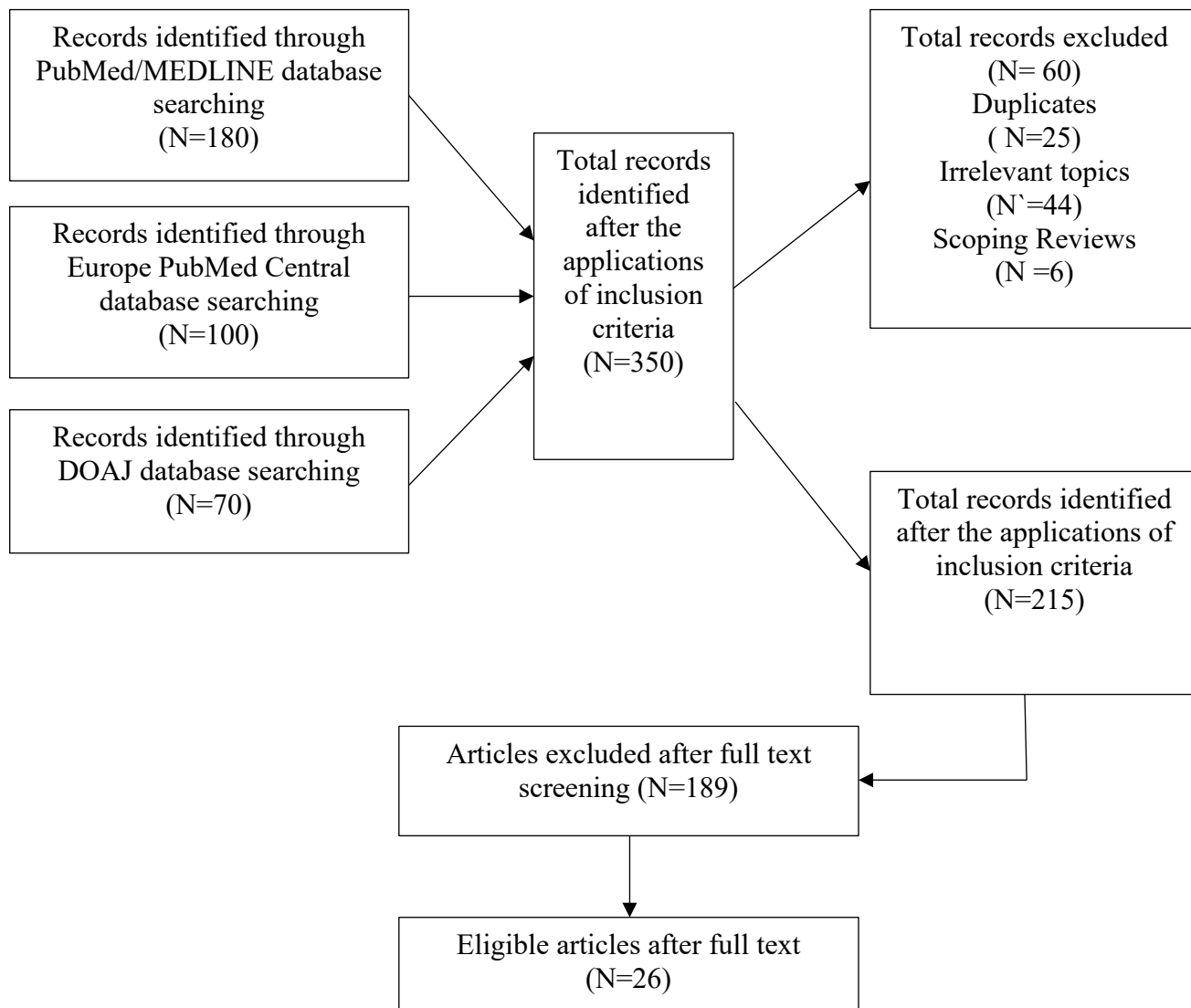


Figure 1. Literature Review Selection Flow Chart

The screening and review process was undertaken independently by the authors and reconciled before settling on the final articles. Critical appraisal was carried out through a systematic assessment of the quality of the studies to ascertain their validity, reliability, as well as their relevance and value to this review. The appraisal tool adopted followed the framework for critiquing health research developed by Caldwell et al. (2011). This is a checklist with 20 questions with Yes/No/Not Applicable response options. A sample of the appraisal questions were: Was the study design appropriate for the research questions? Was the population clearly identified? Was the sampling method clearly reported? Was the instrument's validity and reliability clearly stated? The 26 eligible articles met a 70 percent Yes threshold which was set for articles that met the high methodological quality criteria set for the review while 189 were excluded after full text screening.

The information mined was organized using a charting table to record the key information extracted including, author, reference, and findings applicable to the review questions. This procedure was undertaken with care, using a standardized data extraction form to mitigate possible biases (Peters et al. 2020). The scoping review aimed to include a broad range of sources to map the existing literature comprehensively. Inclusion criteria prioritized relevance to the research question without comprising on methodological rigor. Studies were assessed for methodological rigor. This included clarity of objectives and rationale, comprehensiveness of literature review, currency of the issue, appropriateness of study design, clarity and justification of methodology, clear identification of population, reporting of sampling design and instrumentation, and observation of ethical

protocols. Other criteria were clarity of data analysis and presentation of results as well as comprehensiveness of discussions and conclusion. Each included study was evaluated for its suitability and contribution to the overall understanding of the integration of biopsychosocial and family systems perspectives. In total, 26 articles satisfied the requirements for the scoping review.

Thematic analysis was then utilized to identify common categories and patterns across the extracted information, undertaking narrative content analysis to categorize the information in keeping with past scoping reviews (Arksey & O'Malley 2005). Coding of information into categories was considered as an appropriate approach to the scoping review (Peters et al. 2020). Subsequently, results were summarized, underscoring salient concepts and variations across studies within each category. The literature were mapped by visualizing the distribution of studies across categories using tables. Finally, the synthesized results provided an overall summary of the existing literature. This approach ensured a comprehensive overview of integrating biopsychosocial and family systems perspectives in the assessment for clients presenting in adults with TBI.

The key categories were identified and reported in text and tables. This involved integrating and understanding the data by sifting, organizing, and arranging information based on significant categories (Arksey & O'Malley 2005). This facilitated clear presentation and interpretation of the findings. By combining textual descriptions with tabular representations, the scoping review provided a balanced and accessible overview of the thematic analysis, which facilitated a deeper understanding of the identified categories.

Given that all the studies were in the public domain and were available in open-source databases, no ethical permission was required for this scoping review. Thus, the ethical considerations only entailed selecting the suitable methodology which can generate relevant data to achieve to the objective of the scoping review. Transparency and consistency has been ensured throughout the search strategy and reporting. The methodology employed has been presented and explained in this section in keeping with the standards that govern scoping reviews (Creswell & Creswell 2018).

Table 2. Summary of Articles Reviewed

Author and Year	Country	Region	Study Setting	Sample	Study Design/Methods
1. Broodryk & Pretorius (2015)	South Africa	Africa	Western Cape Rehabilitation Centre, Lentegour Psychiatric Hospital	12 female family caregivers of relatives who had sustained a TBI.	Exploratory qualitative design, using semi-structured interviews and thematic analysis
2. Bugri & Tienkawol Nachinab (2025).	Ghana	Africa	Tamale Teaching Hospital	10 family caregivers of patients with TBI; 5 males and 5 females, aged 21–52 years.	Descriptive exploratory qualitative study, using purposive sampling
3. Chen et al. (2025)	Taiwan	Asia	Tri-Service General Hospital, National Defense Medical University	249 adults with mild TBI	Cross-sectional quantitative study
4. Del Giovane et al. (2023)	United Kingdom	Europe	St Mary's Hospital TBI Clinic, Major trauma wards at Imperial College	308 participants across three stages (224 in Stage 1, 48 in Stage 2, and 50 in Stage 3)	Observational, multi-stage quantitative study

Author and Year	Country	Region	Study Setting	Sample	Study Design/Methods
			Healthcare NHS Trust, St George's Hospital		
5. Dikmen et al. (2001)	USA	North America	Hospital-based/clinical traumatic brain injury rehabilitation	133 patients with moderate-to-severe TBI	Purposive sampling
6. Dillahun-Aspillaga et al. (2013)	Florida, USA	North America	State-wide, communitywide	53 caregivers of individuals with TBI	Purposive convenience sampling
7. Eady et al. (2024)	Canada	North America	Adult Rehabilitation Centre	6 patients, 4 family members, and 10 health professionals.	Purposive sampling
8. Faghihi et al. (2022)	Iran	Middle East	Beheshti Hospital	72 TBI survivors with post-TBI major depressive disorder (P-TBI-MDD)	Single-blind, parallel-group randomized controlled trial (RCT) with a 3-month follow-up
9. Hank et al. (2007)	USA	North America	Rehabilitation Institute of Michigan and Wayne State University	60 primary caregivers of individuals who had sustained TBI 6 months to 15 years previously	Purposive sampling
10. Kolakowsky-Hayner et al., (2001)	USA	North America	Community	57 family caregivers of persons with TBI who were at least 4 years post-injury	Convenience/volunteer sampling
11. Kreutzer et al. (2018)	USA	North America	University health-system inpatient brain injury rehabilitation unit	85 participants, comprising adult survivors of TBI and their family members.	Prospective cross-sectional quantitative study.
12. Liu et al. (2015)	China	Asia	Public Hospital	300 family caregivers of patients with TBI	Cross-sectional descriptive study
13. Mbakile-Mahlanza et al. (2017)	Botswana	Africa	Community-based and healthcare/rehabilitation	44 participants: 26 individuals with moderate-to-severe TBI and 18 caregivers.	Mixed-methods study desng
14. Nabors et al. (2002)	USA	North America	Rehabilitation setting within a Midwestern	45 caregivers: 24 African American and 21 White caregivers of individuals with moderate-to-severe	Cross-sectional quantitative correlational/predictive study

Author and Year	Country	Region	Study Setting	Sample	Study Design/Methods
			academic health-care system	TBI who were at least 1 year post-injury	
15. Nwosu et al. (2020)	Uganda	Africa	Mulago National Referral Hospital	27 adult caretakers of patients with TBI.	Qualitative exploratory study, using semi-structured, in-depth interviews.
16. Perlesz et al. (2000)	Australia	Oceania	Outpatient rehabilitation hospitals	202 participants from 79 families comprising 65 individuals with TBI, 72 primary carers, 43 secondary carers, and 22 tertiary carers.	Cross-sectional quantitative comparative study
17. Rasmussen et al. (2019)	Norway	Europe	Community-based municipal rehabilitation/health-care service	6 participants from 2 families, 3 of whom were patients with TBI.	Purposive sampling
18. Rotondi et al. (2007)	USA	North America	Community-based and rehabilitation-related TBI service settings	165 participants: 80 persons with TBI and 85 primary family caregivers/support persons	Qualitative descriptive study using semistructured interviews and content analysis
19. Sady et al. (2010)	USA	North America	The Institute for Rehabilitation and Research, Methodist Rehabilitation Center, and Mayo Clinic	141 adults with TBI and their caregivers.	Prospective inception-cohort study.
20. Singh et al. (2026)	USA	North America	18 Multicentre Level 1 trauma-centre	451 Individuals with mild TBI 6 months post-injury	Cross-sectional cohort study
21. Theadom et al. (2016)	New Zealand	Oceania	Community	30 adults with TBI; 15 also nominated significant others who participated in interviews	Longitudinal qualitative descriptive study
22. Tsen et al. (2025)	USA	North America	Five Department of Veterans Affairs (VA) Polytrauma Rehabilitation Centers (PRCs)	209 family caregivers of service members and veterans	Observational, cross-sectional study
23. Vangel Jr et al. (2011)	USA	North America	TBI Model System	109 dyads comprising an adult with TBI and their	Cross-sectional quantitative

Author and Year	Country	Region	Study Setting	Sample	Study Design/Methods
			rehabilitation and community follow-up setting	caregiver (218 participants in total).	dyadic correlational /predictive study
24. Von Steinbüchel et al. (2017)	Germany	Europe	Multicentre hospital and rehabilitation	172 individuals with TBI	Cross-sectional observational study
25. Watanabe et al. (2025)	Japan	Asia	Local hospitals, rehabilitation centres, and higher-brain-dysfunction support centres.	128 community-dwelling individuals with TBI	Convenience sampling
26. Winstanley et al. (2006)	USA	North America	Multicentre inpatient brain-injury rehabilitation setting	134 relatives of people with severe TBI, including parents, spouses, and close others	Quantitative observational study using multivariate/path analysis.

Table 3. Study Focus, Key Findings, and Knowledge Gaps

Author and Year	Focus and purpose	Key findings	Knowledge Gaps
1. Broodryk & Pretorius (2015)	Challenges experienced by family caregivers during the initial stages of recovery of a relative following TBI	Caregivers described negative hospital experiences and frustrating interactions with healthcare professionals as major challenges	Small, female-only sample from a single rehabilitation setting limited transferability
2. Bugri & Tienkawol Nachinab (2025).	Experiences of family caregivers of patients with traumatic brain injury	Caregiving was emotionally and socially demanding. Caregivers reported stress, anxiety, difficulties in caring for patients.	Single-site qualitative sample limited transferability
3. Chen et al. (2025)	Distinct post-concussion symptom-severity phenotypes among adults with mild TBI and whether they identify individuals at increased risk of depression.	Greater psychological resilience were protective	The study did not establish whether symptom-severity phenotypes predict depression over time
4. Del Giovane et al. (2023)	Cognitive assessment in patients with traumatic brain injury	Computerised cognitive assessment was feasible, sensitive, and efficient in detecting multiple cognitive deficits	Did not establish its effectiveness for longitudinal monitoring of TBI recovery, particularly under remote conditions

Author and Year	Focus and purpose	Key findings	Knowledge Gaps
5. Dikmen et al. (2001)	Assessing outcome in traumatic brain injury	FSE scores were also associated with family burden, significant-other depression, family sacrifices, recovery, and satisfaction with functioning.	The determinants of family burden, or interventions aimed at reducing caregiver/family difficulties following TBI.
6. Dillahun-Aspillaga et al. (2013)	Unmet support needs of caregivers and families patients with TBI	caregivers experience unmet needs include maintaining relationships, long-term emotional and financial support for themselves and the survivor, and the need for a patient or caregiver advocate.	Use of a small and unrepresentative sample
7. Eady et al. (2024)	How families are involved in adult inpatient traumatic brain injury rehabilitation	Patients and family members perceived family involvement as critical, while health professionals viewed it as not always necessary	Limited to a single inpatient rehabilitation service
8. Faghihi et al. (2022)	Caregivers' depression, anxiety, stress and physical and mental quality of life were assessed before, after, and three months after treatment.	Reatment of depression in TBI survivors produced benefits for their caregivers. CBT was particularly effective, producing significant improvements in caregivers' depression and mental quality of life	Small sample and short follow-up limit generalizability
9. Hank et al. (2007)	Effects of functional status, coping style, social support and family functioning on caregiving appraisal after traumatic brain injury	Emotion-focused coping, family behavioral-control difficulties, and perceived social support were strongly related to caregiver burden	Small regional sample and cross-sectional design limited generalizability
10. Kolakowsky-Hayner et al., (2001)	Unmet support needs of caregivers and families	Caregivers reported diminished quality of life after the injury. Unmet family needs persist well beyond the acute rehabilitation period.	Cross-sectional design limited generalizability
11. Kreutzer et al. (2018)	Needs of family members of people with TBI during inpatient rehabilitation	Health-information needs were most frequently reported as met, whereas instrumental-support and emotional-support needs were most frequently unmet.	Did not establish whether targeted interventions can effectively address persistent unmet needs
12. Liu et al. (2015)	Impact of varying severity of traumatic brain injury on the psychological state and demands of family caregivers	The more severe pathogenic condition of the patient, the heavier the psychological pressure is on their family member caregivers	Limited evidence on how caregivers' psychological experiences and needs develop over time

Author and Year	Focus and purpose	Key findings	Knowledge Gaps
13. Mbakile-Mahlanza et al. (2017)	Experience of family caregiving for individuals with TBI in Botswana and determine its impact on caregiver psychological distress.	Caregivers experienced substantial caregiving demands with limited information and inadequate healthcare-system support.	Cross-sectional assessment limited generalisability
14. Nabors et al. (2002)	Whether caregiver family needs, family functioning, and social support predicted different dimensions of caregiver burden	The study identified family needs as important predictors of caregiver burden	Cross-sectional design also prevented examination of how predictors and caregiver burden change over time
15. Nwosu et al. (2020)	Influence of caretakers' health literacy on delays to traumatic brain injury care	The study identified health-literacy, emotional, financial and health-system barriers that contribute to delays in TBI care	Did not establish the effectiveness of interventions for improving caregiver psychosocial wellbeing and timely access to care.
16. Perlesz et al. (2000)	Psychological distress and family satisfaction following traumatic brain injury	TBI affected the psychological wellbeing and family satisfaction of multiple family members, not only the primary caregiver	Limited evidence on the factors that cause persistent family distress
17. Rasmussen et al. (2019)	The family as a resource for improving patient and family functioning after traumatic brain injury	Family-centered intervention was feasible and acceptable, with high participation and indications of improved family functioning	The small sample limited conclusions regarding its effectiveness.
18. Rotondi et al. (2007)	Needs assessment of persons who have experienced traumatic brain injury and their primary family caregivers	Needs changed substantially across the different phases of recovery.	Did not determine which interventions and service models most effectively address persistent unmet needs.
19. Sady et al. (2010)	Whether family functioning were associated with later community integration among adults with TBI	Better family functioning was associated with better home integration	Preinjury family environment may influence post-TBI community integration
20. Singh et al. (2026)	Interrelationships among mental health, cognitive functioning, and structural brain measures in mTBI.	Insomnia severity, immediate verbal memory, and processing speed were key bridging variables connecting mental health, cognition, and brain structure	Was limited to mild TBI
21. Theadom et al. (2016)	How adults experience fatigue and sleep difficulties during the first two years following TBI	Four themes emerged: making sense of fatigue and sleep after TBI; accepting the need for rest; learning how to rest; and the impact of the need for rest on engagement in life.	Findings may not generalise to other TBI populations

Author and Year	Focus and purpose	Key findings	Knowledge Gaps
22. Tsen et al. (2025)	Long-term self-reported needs of family caregivers of service members and veterans with TBI	Only 56.3% of family caregiver needs were met on average.	Focus on military/veteran populations limit causal inference and generalizability
23. Vangel Jr et al. (2011)	Whether caregiver and family psychosocial functioning predicts the well-being of individuals with TBI	Caregiver/ family psychosocial characteristics contributed unique prediction of TBI survivor outcomes	Cross-sectional design prevented determination of causal or temporal relationship
24. Von Steinbüchel et al. (2017)	Validation of the German QOLIBRI and examination of factors associated with HRQoL and rehabilitation setting	Poorer quality of life associated particularly with greater disability, emotional problems, comorbid health conditions, and impaired cognitive functioning	Did not examine how cognitive impairment and impaired self-awareness influence TBI-specific quality of life.
25. Watanabe et al. (2025)	Relationship between social participation and quality of life in individuals with TBI	Social participation, particularly social integration, was associated with improved self-related quality of life among individuals with TBI	Did not examine other important factors such as family roles
26. Winstanley et al. (2006)	Early indicators and contributors to psychological distress and disrupted family functioning among relatives during rehabilitation following severe TBI	Psychological distress among relatives was mediated by the person's level of community participation.	Observational design limited causal inference

RESULTS

The 26 articles that met the criteria for inclusion are presented in Table 2. The table summarizes the study characteristics such as author and year of publication, country and region where the studies were conducted, the specific study setting, the sample used, and the research design and methodology. The key findings of the study and limitations identified are presented in table 3. In the subsequent sections, the findings from summarized articles are presented to establish the extent of family and inter-disciplinary involvement; and determines integration gaps across biological, cognitive, psychological, social, functional, family, caregiver and relational domains.

The studies included in the scoping review were characterized by considerable geographical spread, although the evidence was largely concentrated in North America. Of the 26 studies, 13 (50.0%) were conducted in North America, while 4 (15.4%) were from Africa, 3 (11.5%) from Asia, 3 (11.5%) from Europe, 2 (7.7%) from Oceania, and 1 (3.8%) from the Middle East.

The geographical distribution indicates that although the review captured findings from many global regions, half of the available evidence originated from two countries: USA and Canada. This suggests that the understanding of systemic assessment among adults with TBI is substantially influenced by research conducted

within western health-care and rehabilitation contexts. In contrast, evidence from Africa and other low- and middle-income contexts was relatively limited.

The studies were conducted across a broad range of settings, but hospital and rehabilitation environments predominated. These included specialist TBI clinics, major trauma wards, inpatient and outpatient rehabilitation hospitals, academic health-care systems, psychiatric hospitals, public hospitals, and rehabilitation centres. Community-based settings accounted for a smaller but important component of the evidence, including community rehabilitation services, community follow-up programmes, and community settings.

Most studies specifically examined caregivers or family members whereas others incorporated both adults with TBI and their relatives or caregivers. This pattern indicates that the evidence base has increasingly recognized TBI as an experience extending beyond the individual patient, with family and caregiver perspectives forming a substantial component of assessment and outcome research.

Methodologically, the included articles employed different approaches, although quantitative observational and cross-sectional studies were prominent. Others were qualitative, mixed-methods, longitudinal, cohort, and experimental designs. Qualitative approaches were used to explore caregiver experiences, family involvement, unmet needs, and lived experiences of TBI, while quantitative approaches were used to examine cognitive functioning, caregiver burden, family needs, psychological wellbeing, quality of life, social participation, and relationships between family characteristics and TBI outcomes.

Relatively fewer studies adopted mixed-methods, a randomized controlled, and longitudinal/prospective designs that provided evidence beyond the predominantly cross-sectional literature. The characteristics of the included studies suggest that assessment has frequently been undertaken within separate clinical, psychological, functional, or family domains rather than through consistently integrated biopsychosocial and family-systems approaches. Therefore, while the literature demonstrates a general recognition of the multidimensional nature of TBI, the diversity in study characteristics points to a continuing need for a systemically integrated assessment.

Table 4 presents the thematic categorisation of assessment domains identified in the literature on adults with traumatic brain injury (TBI) and their families. The table synthesises the major categories, thematic codes, and supporting references, highlighting assessment of individual functioning, family and caregiver experiences, family relationships and functioning, functional and quality-of-life outcomes, and family and interprofessional involvement.

Table 4. Thematic Categorization of Assessment Domains

Category	Thematic Codes	References
Domains Assessed in Adults with TBI:	Cognitive Functioning, Psychological Functioning, Symptoms, Mental Health, Fatigue and Sleep, Social Participation, Quality of Life, and Functional Outcomes	Chen et al. (2025), Del Giovane et al. (2023), Dikmen et al. (2001), Singh et al. (2026), Theadom et al. (2016), Von Steinbüchel et al. (2017), Watanabe et al. (2025)
Family and Caregiver Assessment:	Caregiver Stress, Anxiety, Depression, Psychological Distress, Unmet Needs, Health Literacy, Social Support, Caregiving Demands, and Quality of Life	Broodryk and Pretorius (2015), Bugri and Ti-enkawol Nachinab (2025), Dillahun-Aspillaga et al. (2013), Faghihi et al. (2022) Kolakowsky-Hayner et al. (2001), Kreutzer et al. (2018), Liu et al. (2015), Mbakile-Mahlanza et al. (2017), Nwosu et al. (2020) Tsen et al. (2025)
Family Functioning and Relational Assessment:	Family Functioning, Family Relationships, Family Satisfaction, Family Needs, Social Support, and the Psychosocial Functioning of Caregivers and Other Family Members.	Hank et al. (2007), Nabors et al. (2002), Perlesz et al. (2000), Rasmussen et al. (2019), Sady et al. (2010), Vangel Jr. et al. (2011), Winstanley et al. (2006)

Functional and Quality-of-Life	Functional Status, Recovery, Satisfaction With Functioning, Community/Home Integration, Health-Related Quality Of Life, And Social Participation.	Dikmen et al. (2001), Sady et al. (2010), Theadom et al. (2016), Von Steinbüchel et al. (2017), Watanabe et al. (2025)
Family and Interprofessional Involvement:	Family Members, Caregivers, Significant Others, and Healthcare Professionals	Broodryk and Pretorius (2015), Eady et al. (2024), Mbakile-Mahlanza et al. (2017), Rasmussen et al. (2019), Rotondi et al. (2007)

Table 4 shows that 7 of the 26 included studies (26.9%) addressed domains assessed directly among adults with TBI, covering cognitive functioning, psychological functioning, symptoms, mental health, fatigue and sleep, social participation, quality of life, and functional outcomes. Chen et al. (2025) examined post-concussion symptom-severity phenotypes and their relationship with depression, while Del Giovane et al. (2023) focused on cognitive assessment. Dikmen et al. (2001) assessed functional outcomes, Singh et al. (2026) examined the interrelationships among mental health, cognitive functioning, and structural brain measures, and Theadom et al. (2016) explored fatigue, sleep difficulties, and their effects on engagement in life. Von Steinbüchel et al. (2017) examined health-related quality of life, whereas Watanabe et al. (2025) investigated social participation and quality of life. Together, these findings indicate that assessment of adults with TBI extends beyond neurological impairment to encompass cognitive, psychological, functional, participatory, and quality-of-life dimensions.

Family and caregiver assessment was the most frequently represented thematic category, occurring in 10 of the 26 studies (38.5%). The assessment domains included caregiver stress, anxiety, depression, psychological distress, unmet needs, health literacy, social support, caregiving demands, and quality of life. Broodryk and Pretorius (2015) and Bugri and Ti-enkawol Nachinab (2025) documented caregivers' challenges and emotional and social demands, while Dillahun-Aspillaga et al. (2013), Kolakowsky-Hayner et al. (2001), Kreutzer et al. (2018), and Tsen et al. (2025) identified persistent unmet support needs among families and caregivers. Faghihi et al. (2022) assessed depression, anxiety, stress, and physical and mental quality of life among caregivers, while Liu et al. (2015) demonstrated that greater TBI severity was associated with greater psychological pressure among family caregivers. Mbakile-Mahlanza et al. (2017) identified substantial caregiving demands alongside limited information and inadequate healthcare-system support, and Nwosu et al. (2020) identified health-literacy, emotional, financial, and health-system barriers. The relatively high representation of this family and caregiver assessment suggests that the TBI literature recognises caregivers as important stakeholders in assessment.

Seven of the 26 studies (26.9%) addressed family functioning and relational dimensions, including family functioning, family relationships, family satisfaction, family needs, social support, and the psychosocial functioning of caregivers and other family members. Hank et al. (2007) found that emotion-focused coping, family behavioural-control difficulties, and perceived social support were strongly related to caregiver burden, while Nabors et al. (2002) identified family needs as important predictors of caregiver burden. Perlesz et al. (2000) demonstrated that TBI affected the psychological well-being and family satisfaction of multiple family members, indicating that consequences extend beyond the primary caregiver. Rasmussen et al. (2019) found that a family-centred intervention was feasible and acceptable, with indications of improved family functioning. Sady et al. (2010) found that better family functioning was associated with better home integration, while Vangel Jr. et al. (2011) showed that caregiver and family psychosocial characteristics contributed uniquely to the prediction of TBI survivor outcomes. Winstanley et al. (2006) further found that psychological distress among relatives was mediated by the injured person's level of community participation. Together, the findings demonstrate that TBI has relational consequences and that assessment of the individual's condition alone may overlook important family-level factors.

Five of the 26 studies (19.2%) addressed functional and quality-of-life assessment, including functional status, recovery, satisfaction with functioning, community and home integration, health-related quality of life, and social participation. Dikmen et al. (2001) found that functional status was associated with family burden, significant-other depression, family sacrifices, recovery, and satisfaction with functioning, illustrating the interconnection between functional outcomes and family consequences. Sady et al. (2010) linked family

functioning with home integration, while Theadom et al. (2016) showed that fatigue and sleep difficulties influenced engagement in life during the first two years following TBI. Von Steinbüchel et al. (2017) found poorer quality of life to be associated particularly with greater disability, emotional problems, comorbid health conditions, and impaired cognitive functioning. Watanabe et al. (2025) further found that social participation, particularly social integration, was associated with improved self-related quality of life. The findings collectively suggest that functional recovery following TBI should be understood in broader terms than physical independence, incorporating participation, psychosocial functioning, social integration, and perceived quality of life.

Family and interprofessional involvement was represented in 5 of the 26 studies (19.2%), with attention to family members, caregivers, significant others, and healthcare professionals. Broodryk and Pretorius (2015) identified frustrating interactions with healthcare professionals as a major challenge experienced by caregivers during the initial stages of recovery. Eady et al. (2024) provided particularly direct evidence by examining family involvement in adult inpatient TBI rehabilitation from the perspectives of patients, family members, and health professionals; patients and family members regarded family involvement as critical, whereas health professionals did not always regard it as necessary. Mbakile-Mahlanza et al. (2017) identified inadequate healthcare-system support, while Rasmussen et al. (2019) demonstrated the feasibility and acceptability of a family-centred intervention. Rotondi et al. (2007) assessed the needs of both people who had experienced TBI and their primary family caregivers. These findings indicate that although family participation is recognised as valuable, its incorporation into rehabilitation and assessment is not consistently understood or implemented across professional groups.

SUMMARY OF RESULTS

The results reveal a strong convergence toward viewing TBI as a condition with consequences extending beyond the injured individual to the family and wider social environment. Of the 26 studies, family and caregiver-related assessment was the most represented (10 studies, 38.5%), with repeated evidence of caregiver stress, psychological distress, unmet needs, reduced quality of life, and inadequate informational or health-system support (Bugri & Ti-enkawol Nachinab, 2025; Dillahun-Aspillaga et al., 2013; Kolakowsky-Hayner et al., 2001; Mbakile-Mahlanza et al., 2017; Tsen et al., 2025). Similarly, 7 studies (26.9%) examined family functioning and relational outcomes, while 7 studies (26.9%) assessed individual domains such as cognition, psychological functioning, symptoms, fatigue, sleep, participation, and quality of life. The convergence therefore supports a multidimensional understanding of TBI in which patient outcomes and family experiences are closely interconnected (Dikmen et al., 2001; Hank et al., 2007; Perlesz et al., 2000; Vangel Jr. et al., 2011).

A second point of convergence relates to the nexus between functional, social, psychological, and family outcomes. Five studies (19.2%) addressed functional and quality-of-life outcomes, demonstrating associations between disability, emotional and cognitive problems, social participation, and quality of life (Von Steinbüchel et al., 2017; Watanabe et al., 2025). Another 5 studies (19.2%) examined family and interprofessional involvement, with evidence that family participation can contribute to rehabilitation and family functioning (Eady et al., 2024; Rasmussen et al., 2019). However, the findings also revealed important divergence in perspectives and priorities. Whereas patients and family members considered family involvement critical, healthcare professionals did not always regard it as necessary (Eady et al., 2024). Further, studies differed in emphasis, ranging from cognitive and symptom assessment (Chen et al., 2025; Del Giovane et al., 2023; Singh et al., 2026) to caregiver needs, family functioning, social participation, and quality of life, suggesting that assessment remains fragmented across domains.

Only 6 studies (23.1%) provided evidence relevant to integrated or systemic assessment, particularly by demonstrating relationships among patient functioning, caregiver/family psychosocial characteristics, family functioning, community participation, and rehabilitation outcomes (Dikmen et al., 2001; Rasmussen et al., 2019; Sady et al., 2010; Vangel Jr. et al., 2011; Winstanley et al., 2006). There was consensus in showing that outcomes in one domain may influence or be associated with outcomes in another. For instance, better family functioning was link to better home integration, while community participation was associated with relatives' psychological distress (Sady et al., 2010; Winstanley et al., 2006).

Integrating Biopsychosocial and Family Systems Perspectives

The reviewed studies demonstrate partial integration of biopsychosocial and family-systems perspectives in TBI assessment. About 11 of the 26 studies (42.3%) showed comparatively strong integration by simultaneously considering individual clinical/psychological functioning and family, caregiver, social, or functional dimensions. These include Dikmen et al. (2001) who linked functional outcomes with family burden, significant-other depression, family sacrifices, recovery, and satisfaction with functioning. Similarly, Hank et al. (2007) connected functional status, coping, social support, and family functioning with caregiver burden while Vangel Jr. et al. (2011) demonstrated that caregiver and family psychosocial characteristics contributed uniquely to survivor outcomes. These results align in demonstrating that TBI outcomes are relational rather than exclusively neurological. Accordingly, the following conceptual framework show how individual, family/caregiver, relational, functional/social, and interprofessional domains interact within systemic TBI assessment.

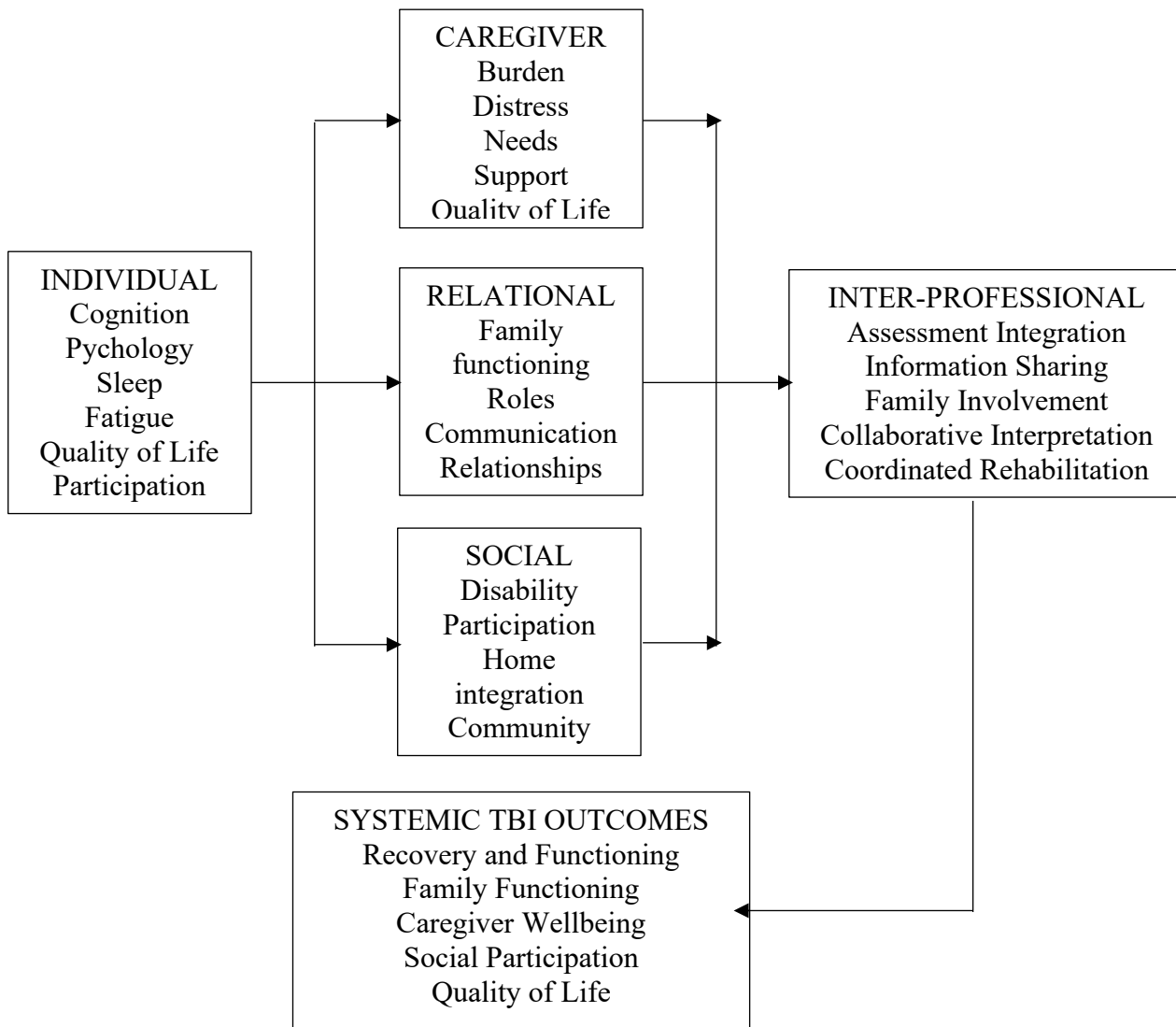


Figure 2 Conceptual Integration of Systemic Traumatic Brain Injury Assessment

The proposed conceptual integration favours a dynamic interconnection of five fundamental domains to systemic TBI outcomes. These are: individual, caregiver, relational, social, and inter-professional domains, with the inter-professional domain functioning as an integrative hub through which insights across the other domains are jointly assessed, interpreted and considered in rehabilitation planning. The framework migrates TBI assessment from an individual and impairment-centered viewpoint towards a unified model that accounts for the reciprocal link between functioning, caregiver experiences, family relationships, social participation and rehabilitation outcomes.

Knowledge Gaps

The main gap is that the studies generally assessed selected domains or relationships rather than applying one comprehensive biopsychosocial and family-systems assessment framework. Although the evidence supports multidimensional and relational assessment, comprehensive systemic integration of biological, cognitive, psychological, functional, social, family, caregiver, and interprofessional dimensions remains insufficiently developed. A second major gap concerned insufficient evidence on the development of needs, outcomes, and difficulties over time and on the effectiveness of interventions to address them. The reviewed studies reported limited evidence regarding how caregiver psychological experiences and needs evolve across recovery. Similarly, gaps remained with respect to the effectiveness of family-centred interventions, longitudinal assessment of cognitive recovery, and interventions that improve caregiver psychosocial wellbeing.

The most salient gap identified in the present review is the fragmentation of assessment across individual, family, and social domains. Although the studies show relationships among cognition, psychological functioning, family functioning, caregiver characteristics, participation, and quality of life, individual studies generally focus on selected domains rather than integrating them into a comprehensive systemic assessment. This is also evident in gaps such as the failure to examine family roles alongside social participation, the limited examination of factors contributing to persistent family distress, and the lack of investigation into how cognitive impairment and self-awareness influence TBI-specific quality of life. Therefore, the gaps signal the need for an integrated biopsychosocial and family-systems assessment approach.

Future Studies

The key integration gap for future research is the absence of a fully integrated biopsychosocial-family systems model. Important gaps include the limited consideration of family roles in relation to social participation, insufficient longitudinal examination of caregiver and family needs, and limited evidence with respect to how interventions can address persistent family and caregiver difficulties. Future studies should therefore move from assessment of separate domains toward integrated, longitudinal, or family-level assessment, taking into account psychological wellbeing, functional participation, caregiver wellbeing, family functioning, social support, and healthcare-system interactions within the same assessment framework.

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